PALÆONTOGRAPHICAL SOCIETY.

v. 4

THE CRAG MOLLUSCA.

Part II.
BIVALVES.

MOLLUSCA FROM THE GREAT OOLITE.

Part I.
UNIVALVES.

BRITISH OOLITIC AND LIASIC BRACHIOPODA.

Part III.

1850.

California Academy of Sciences

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MDCCCL.

A MONOGRAPH

OF

THE CRAG MOLLUSCA,

OR,

DESCRIPTIONS OF SHELLS

FROM THE

MIDDLE AND UPPER TERTIARIES OF THE EAST OF ENGLAND.

BY

SEARLES V. WOOD, F.G.S.

PART II.

BIVALVES.

LONDON:
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A MONOGRAPH

OF THE

MOLLUSCA FROM THE CRAG.

BIVALVIA, *Linnæus*, 1767.

Bivalvia. *Bonanni*, 1681. *Lister*, 1686. *Flem.* 1828.
Dithyra. *Arist. Turt.* 1822. *Swains.* 1840.
Ditoma. *Tournefort*, 1742.
Acephala Testacea (part). *Cuv.* 1789.
Lamellibranchiata. *De Blainv.* 1814.
Conchifera (part). *Lam.* 1818.
Conchæ. *Leach.* 1819.
Pelecypoda. *Goldfuss*, 1820.
Endocephala (part). *Lat.* 1825.
Elatobranchia. *Menke*, 1830.
Cormopoda. *Burm.* fide *Herrm.*

Animals of this Division of the Linnean Testacea have no proper head, their most vital parts are enveloped in a mantle, or pallium, as it is called, which surrounds them on all sides; the edges of this mantle are sometimes plain, at others fringed, and are more or less united: what is called the foot, is generally a large and powerful muscular mass, capable, in some species, of being protruded beyond the shell to a considerable distance. The respiratory organs, or *branchiæ*, are usually four in number, and are arranged in the form of ruffles enveloping the abdominal mass, but entirely included within the mantle; in some few of the species, the number of these feathery appendages is less, while in others there are more, than four. The animal is protected by two portions of shelly matter called valves, these are secreted by and formed upon the mantle, and are articulated together by a cartilage and ligament, by which the two pieces are held in position, and move, as it were, like a door upon its hinge, or rather

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like the two covers of a book, this is furthermore often strengthened by prominences and depressions in a part of the shell kept thickened for the purpose, interlocking each other, preventing, in most instances, the possibility of any material inconvenience arising from lateral motion without a fracture. The common action of the valves in their separation or opening is from the relaxation of the adductor muscles, when from the natural elasticity of the ligament the valves are drawn apart, and again closed by the contraction of the muscle or muscles that pass from one valve to the other, strongly adhering to the inner surface of the shell on which, in most cases, a distinct, and often a deep indentation is left.

The muscular fibres by which the edges of the mantle are withdrawn adhere to, and leave a linear impression somewhat within the margin of the shell; and, in some of the Bivalvia, at the posterior side of the animal, are two siphonal tubes, formed by the prolonged portions of the mantle, the lower one is called the inhalent, the upper one the exhalent siphon, these tubes are capable of being protruded by the animal with the assistance of muscles for that purpose, and again withdrawn under the protection of the shell. In animals possessed of these tubes, the withdrawal of them is indicated in an impression on the body of the shell by the retractor muscle, leaving what is called a siphonal scar, or palleal sinus, which generally denotes, by its depth, a corresponding proportion in the length of the tubes; and where the muscular fibres of the mantle adhere to the interior, leaving the impression without an inflection, the animal either has no prolongation of the mantle, or that the tubes are so short as scarcely to be capable of extension beyond the margin of the valves, and the impression in that case formed by the mantle is parallel, or nearly so, to the outer edge of the shell.

These marks, therefore, are of essential service to the Palæontologist, as they afford the only indications of the form possessed by the animal inhabitant, thus impressed upon the interior of the valves. It is however to be feared, that a perfectly strict reliance cannot always be placed upon the peculiar magnitude of this siphonal scar, even in specific determination, as a marked deviation from what might otherwise be considered its typical form may occasionally be detected, but it is in those species which are most subject to variation in the outward forms of the shell; as a general rule, this line, when visible, is of the greatest assistance, and at all times a good auxiliary character in the determination of a species. The length of the siphonal tubes, or the consequent indenture or sinuation of the mantle mark in the shell, points out a difference in the animal from those in which the sinus is wanting, or at least nearly so, where it indicates a mantle either without or with very short siphons, giving fair grounds for generic separation; but occasionally, species are met with that are otherwise very closely allied, having a similar dentition, and bear the same general relationship in regard to the shell, although very unlike in the form of the mantle-mark, such as *Leda* and *Nucula*, *Cardium* and *Adacna*, *Lucina* and *Lucinopsis*, and cannot, without violence to a natural arrangement, be removed to any distant position, merely, in consequence of a difference in the length of the tubes or depth of the sinus.*

Some Malacologists seem disposed almost entirely to reject the shell, as unworthy of consideration in a Zoological arrangement, viewing it in the light of an inert or inorganic mass, unconnected with the animal, or at least merely formed by and used as a protection to its more vital parts, and have based their superstructure upon the mantle itself, and upon the difference in length of its siphonal tubes. In the 'History of British Animals,' by Dr. Fleming, published in 1828, the Bivalvia were separated into two sections, called SIPHONIDA and ASIPHONIDA, a division subsequently adopted by some continental authors under the denominations SINUPALEALIA and INTEGROPALEALIA, as founded upon a portion of the animal more highly organised than its dermal covering, and, consequently, supposed to give a more scientific basis to its classification. Investigations by the microscope have shown a high degree of organisation, and the possession of a considerable amount of vitality in the shell, essential to the existence, depending upon, and modified by the exigencies of the animal; and in this outer coating of the mantle there is preserved a relationship apparently more constant than is exhibited by its fleshy interior; and whatever other organs, in the more vital parts may be supposed to furnish a basis for Ordinal division, it is very doubtful if the form of the mantle alone will be sufficient.

The number and position of those parts of the hinge called teeth are essential distinctions, as there is a permanence of form in the dentition of all genera, although, in a few instances, these characters which are prominent and distinctive in some species, will be diminished and become nearly obsolete in others; but they do not vary in form or position in the same genus.† That portion of the hinge called the *ligament*, performs an important office in the animal economy, as it is by this the valves are bound together, and kept in their true position. This uniting and elastic substance is called *cartilage,* when it is placed within the edges of the valves, and is consequently compressed when they are closed, and by its tendency to expand at the relaxation of the adductor muscle or muscles, assists in the separation of the shells at the ventral margins: that portion which is external, is called *ligament*, and is generally placed on a prominent fulcrum, or projecting portion of the shell, and by its elasticity or contraction draws back and opens the valves when the opposing power of the adductors is relaxed; although this substance is of a cartilaginous nature, and contains but a small portion of lime, and is consequently not often preserved in a fossil state, its position is always indicated where it has been, either by a pit or depression for its reception, or by the fulcrum to which it was attached. In the smaller portion of the Bivalvia, the animal is furnished with only one adductor muscle, and constitutes that division or section called *Monomyaria,* or *Unimusculosa,* by some authors. In this, the muscle is placed in the centre, or nearly so, and is generally large and powerful, adhering strongly to the interior, leaving often a deep indentation which is sometimes of a different colour to the rest of the shell; the form of this muscle mark is variable in different genera, but is not of much assistance in specific determination. Some of these have the hinge ligament on the exterior, like the Oyster, &c., where it acts by contraction and elongation; in others, Pecten, &c., its action is by expansion and compression; in this group, the edges of the mantle are generally disunited and not prolonged into siphons, and the impression formed by its muscles within the shell, is without any inflection, and parallel to the margins of the valves. In the much larger portion, called *Dimyaria,* or *Bimusculosa,* the animal has two distinct adductor muscles, one of which is situated near the anterior margin, while the other occupies generally a corresponding position on the posterior side.

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* Great differences also exist between the mantles of some of the members of the Leptonidæ.

† There is a slight exception to this rule in the hinge of the Polyodonts, *Leda, Pectunculus, &c.*, where the *number* of teeth will vary, even in individuals of the same species at different periods of existence, but their general character is not altered.

As these muscular impressions are relatively situated in the same position, and always of the same form, a great alteration takes place during the growth of the animal by a gradual progression, as it increases in size and the shell enlarges; the successive advancement of these impressions is indicated in many species by distinct lines of growth: and as this enlargement necessarily increases outwardly, the animal possesses the power of making fresh additions to the exterior portion of the muscle, while at the interior part, the now becoming useless or inconvenient portion, is detached from its former place of adherence, and absorbed by the animal; while in most species, a fresh layer of calcareous matter, secreted from the whole surface of the mantle, is deposited upon the interior of the shell, and covering the deserted portion of the muscle mark, leaving untouched that part only against which is attached its powerful adductor. In the Oyster, more especially, these successive layers are distinctly visible, showing the enlargment of the shell by the extension of the mantle in the lines of growth upon the exterior, as also by the generally rugose or lineated surface of the ligamental area. The same may be said of the dental characters of the shell which are always relatively placed in regard to the specimen, whether in the young or in the adult; and the alteration, therefore, of their position in the growth of the shell, can only be effected by the removal of one part, while fresh deposition is formed on the other, unless the whole be sufficiently organised to partake of the varying changes of the animal itself: a question as yet not satisfactorily determined.

Dr. Carpenter gives in his 'Report on the Microscopic Structure of Shells,' as the true history of the *Conchiferous Acephala,* the following account:—"The *margin* only of the mantle has the power of giving origin to the *outer* layer of the shell, while the *whole surface* may generate the *inner*. Every new production of shell consists of an entire lamina of the latter substance, which lines the whole interior of the old valve, and of a broader margin of the former which thickens its edge. So long as the animal continues to increase in dimensions, each new exterior layer of shell projects so far beyond the preceding, that the new border composed of the outer layer, is simply joined on to the margin of the former one, so that the successive formations of the outer layer scarcely underlie each other. But when the animal has arrived at its full growth, the new laminæ cease to project beyond the old, and as each is composed of a marginal band of the external substance attached to the edge of an entire lamina of the inner, these bands must now underlie each other, being either quite free as in Ostrea, or closely united to each other as in Unio, and most other Bivalves; and the additions to the shells of the Gasteropoda are made upon the same plan, although it has commonly been supposed that they are only attached to the edge of the old shell, instead of being continued over its entire surface."

The figure and size of the foot materially influences the form of the anterior part of the shell, while the posterior depends upon the modification of the siphons. The degree of development of the nervous system is said to be very variable in these animals, and the organs of sense dependant thereon variously distributed, imperfect organs of sight are present in some species, and rudimentary organs of hearing have been detected in others, and are possibly present in all: while in some, the sexes are separate and distinct, in others they are united or hermaphrodite, microscopic animals and plants constitute their principal food.

Species of this class have been found in the seas of every clime, and inhabit the waters of all depths, some few are left dry by the retiring tide, while others frequent the bottom of seas, to the depth of 200 fathoms; and the vertical range of many species is so extensive, as to render doubtful the allocation of strata from the presence of a few fossil forms, with whose habits we are but indifferently acquainted; moreover, the habits of all recent species are not, perhaps, necessarily the same as those of their prototypes that lived in times long past, and probably, under different conditions.

The authors of the beautiful work upon the 'British Mollusca,' now in the course of publication, have given many interesting details respecting the range in depth at which most of these animals have been obtained, and occasionally, the nature of the ground they had selected for their habitation; the generality of species prefer clear water and a sandy bottom, but others are frequenters of mud. The bottoms of the Crag Seas, judging from the deposits now remaining upon the Eastern Coasts of England, appear to have been principally of sand or gravel, with comminuted fragments of shells; that of the Coralline Crag Sea being generally fine in its particles, formed at a depth varying, perhaps, from 20 to as much as 40 fathoms, if the habits of the then existing animals were the same as their homologues of the present day. The Red Crag Sea appears to have been subject to greater agitation, and was probably less in depth, while much of its bottom was of a gravelly character, or of coarser sand. The deposits of the Mammaliferous Crag Period present us with characters rather more variable; that which is found near Norwich, being what is called Fluvio-marine, formed probably, in a shallow estuary, and composed of sand, gravel, and shells, while the Bridlington bed was more purely marine, with a bottom apparently of sandy mud, similar to what is exhibited by the newly discovered tranquil deposit resting upon the Red Crag at Chillesford, where the water may have been of some considerable depth.

In estimating the dimensions of the shell in the following descriptions, the proportions are given only as an approximation; in most species, these are more or less variable. The length is taken from the anterior edge of the shell to the outermost portion of the posterior side, that being considered as anterior where the foot is protruded, while the position of the ligament and the siphonal tubes, where they exist or their presence shown in the shell by the sinuated form of the pallial impression, is on the posterior side. Presuming, therefore, the animal to move with the foot foremost, it will have its dorsal or hinge-part of the shell uppermost, and the diameter from the umbo to the ventral margin is called its height, while the depth is measured from the most tumid part of one valve to the corresponding place in the other.

ANOMIA.* *Linn.* 1767.

ANOMIA. *Müller.* 1776.
GLYCIMERIS. *Browne,* 1756.
LAMPADES (sp.). *Gevers.* 1787, fide *Gray.*
FENESTELLA. *Bolton.* 1798, fide *Herrmansen.*
ECHION and ECHIODERMA. *Poli.* 1791.
CEPA. *Humphries,* 1797.
ANOMYA. *Agass.* 1839.

Generic Character. Shell irregular, inequivalved, subequilateral, ovate or suborbicular, and fixed: lower or inferior valve more or less flattened, with a large foramen or perforation, through which passes a bony or calcareous appendage for the attachment of the animal; upper valve, convex smooth or irregularly laminated, sometimes striated, costated or muricated, often assimilating the body of the shell to that on which it is fixed; one muscular impression in the lower or fixed valve, with three in the upper or convex one; ligament internal, placed a little within the umbo of the upper or larger valve, in a somewhat triangular pit, with a projection near the edge of the foramen in the opposite valve, to which it is attached; hinge without teeth.

The animal of this genus, is said to have the edges of the mantle disconnected, the margins bearing a double fringe of short scirrhous appendages, without ocelli or rudimentary eyes. No siphonal tubes, and foot very small, nearly obsolete. The adductor muscle is divided into three parts, making three distinct impressions on the upper, while one only is formed upon the lower valve, the other two passing into the calcareous operculum by which it is fixed. Sexes distinct.

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* Etym. Ἀνόμοιος, unlike or unequal.

As the individuals of this genus are always attached, they are seldom of a regular form, but generally more or less distorted, modified by, and often assuming the shape and characters of the body to which they adhere; and as they are frequently attached to the shells of the Pecten, an individual of this genus, which in its natural state is nearly smooth, will become, in consequence, rayed or pectinated, partaking of the characters of the body it has been living upon. If, therefore, it be attached near the umbo of the Pecten, its regular increase will assume the form of that genus; but if its attachment be upon the wider rays, these ribs will not represent the regular form, but the impress of its place of attachment will be shown, as in fig. 3 *b*, in parallel or nearly parallel ridges across the shell. In order to produce this appearance, the addition that is made by the mantle to the edges of the shell are carried over the ribs of the Pecten down into the interspaces, by which means a costated form is given to a shell, otherwise smooth. This character, however, according to Mr. Clark, appears to be eclectic, or at the will of the animal. Thus, whenever the under or lower valve has its edges elevated above the ribs of the Pecten, so as not to be influenced by those inequalities, then the upper valve retains its original form. The lower valve is generally thin, often papyraceous, so that in the fossil state, the upper valve is the most numerous.

The Anomia is closely allied to the Pectens, and the perforation in the lower valve, is said by the authors of the 'Hist. of Brit. Mollusca,' to be chiefly a greater extension of the auricular sinus of that genus; and that the young fry will be probably found attached by means of a byssus, which as the animal increases, eventually becomes converted or transformed into the calcareous opercular process of the older shell, this organ of attachment being merely the extension and indurated portion of the lower part of the adductor.

A large number of detached valves are found in the Coralline Crag, but their specific appropriation is a matter of great difficulty from their excessive variability of form, as well as great irregularity in their external ornament; and as their correct assignment, even in a recent state, with "all appliances and means to boot" by the aid of their animal inhabitant, as well as by assistance given in the colouring matter of the shell, is still a doubtful matter, the appropriation of the fossil species may be looked upon with suspicion.

Mr. Clark in the examination of this genus, has arrived at the conclusion, that there is but one species now found in the British Seas; and that the extraordinary variation both in form and sculpture, exhibited by individuals, is so fluctuating in character, as not to be depended upon for specific distinction. As, however, there are generally some marked differences in these shells by which the variations may be separated, I have followed the authors of 'British Mollusca,' in considering them for the present so many distinct species.

This genus is found in the Secondary Rocks; one species has been described by Mr. Bean, from the Cornbrash; 'Mag. Nat. Hist.' 1839. And some from the Greensand by Dr. Fitton.

1. ANOMIA EPHIPIUM, *Linnæus.* Tab. I, fig. 3, *a—d.*

ANOMIA EPHIPPIUM. *Linn.* Syst. Nat. ed. 12, p. 1150, No. 218, 1767.
— SQUAMULA. *Id.* - - - p. 1151, No. 221.
— — *Turt.* Brit. Biv. p. 229, pl. 18, fig. 5-7, 1822.
— — *Broc.* Conch. Foss. Subap., p. 461, 1814.
— — *Dekay.* Nat. Hist. New York (Zool.), p. 168, pl. 12, fig. 209, 1843.
— — *Middendorff.* Malacozoologia Rossica (Mem. de l'Acad. des Sc. Imp. de St. Petersb.), p. 519, t. 11, fig. 18-21, 1849.
— SULCATA. *Poli.* Test. Sic. vol. ii, p. 186, t. 30, fig. 12.
— MARGARITACEA. *Id.* - - t. 30, fig. 11.
— CŒPA. *Id.* - - - t. 36, figs. 1, 25-8.
— LENS? *Goldf.* Pet. vol. ii, p. 40, t. 88, fig. 8, *a—e.*
— EPHIPPIUM. *S. Wood.* Catalogue, 1840.
— COSTATA. *Broc.* Conch. Foss. Subap., p. 463, t. 10, fig. 9, 1814.
— RADIATA? *Id.* - - - - t. 10, fig. 10.
— SULCATA? *Id.* - - - - t. 10, fig. 12.

Spec. Char. Testá polymorphá, crassá vel tenui, plerumque lavigatá, formá valdè irregulari.

Shell many shaped, thick and strong, sometimes thin and fragile, generally smooth, form very irregular.

Diameter, $\frac{3}{4}$ths of an inch.

Locality, Cor. Crag, Sutton, Sudbourn.

Recent, Mediterranean, Britain, Scandinavia, North America.

The variety of this species, called *squamula,* is exceeding abundant in the Coralline Crag, and like the recent shell, is subject to great distortion, depending upon the body to which it has been attached; a large number of these specimens have taken the characters of the genus Pecten, to which, in the living state they were attached, but it is only in the upper or free valve that I have been able to observe the costated form, the lower or adherent one was probably much thinner, and less capable of preservation.

A few specimens of the lower or perforated valve are occasionally met with, and in all that I have seen, the valve is externally smooth, at least, free from striæ or costæ, and its place of attachment was some smooth or even surface. This variety does not appear to have attained the size of more than $\frac{3}{4}$ths of an inch in diameter, and the majority of specimens have not reached above half those dimensions. In those which have the upper valve quite flat and smooth, the place of attachment was probably the interior of some shell, from which the lower valve would take the convex form, giving room between the two for the occupation of its inhabitant. The beak or umbo of this species, is almost immediately at the margin or projecting a little beyond it.

The variety called *cylindrica* or *cymbiformus* (fig. 3, *c*), is also occasionally found in the Coralline Crag, though by no means abundantly. It has been determined by British Conchologists, that this form is produced from its place of adherence being the stem of the seaweed, or some such cylindrical body,[*] while the variety *fornicata* is said to be merely a deformity from some similar cause; this I have not yet seen in the fossil state. The exterior of some of the Crag specimens indicate their place of rest to have been upon a *Bryozoon,* the shell being prettily and distinctly marked by that animal.

Some idea may be formed of the Protean character of this species, as no less than eighteen different specific names are introduced by the authors of the 'Hist. of Brit. Moll.' into their synonyma, while these, with several others by them, considered as distinct, are included as mere varieties by Mr. Clark.

2. ANOMIA ACULEATA, *Müller.* Tab. I, fig. 2, *a—b.*

ANOMIA ACULEATA. *Müll.* Zool. Dan. Prod., p. 249, 1766.
— — *Mont.* Test. Brit., p. 157, pl. 4, fig. 5, 1803.
— — *Brown.* Brit. Conch. Illust., pl. 34, fig. 6, 1827.
— — *S. Wood.* Catalogue, 1840.
— — *Gould.* Invert. Massach., p. 139, fig. 90, 1841.
— — *Philippi.* En. Moll. Sc., vol. ii, p. 214, t. 28, fig. 1, 1841.
— — *Thorpe.* Brit. Mar. Conch., p. 123, fig. 73, 1844.
— — *Loven.* Ind. Moll. Scand., p. 30.
— — *Dekay.* Nat. Hist. New York (Zool.), p. 168, pl. 12, fig. 210.
— STRIOLATA. *Turt.* Brit. Biv., p. 233, 1822.
— — *W. Wood.* Ind. Test., p. 54, pl. 11, fig. 7, 1825.
— — *Flem.* Brit. An., p. 396, 1828.
— — *Thorpe.* Brit. Mar. Conch., p. 123, 1844.

Spec. Char. Testâ suborbiculari vel ovatâ; striatâ, striis plurimum numerosis, radiantibus, squamoso-aculeatis; umbone submarginali, lævi.

Shell suborbicular or ovate; striated, striæ generally numerous, with fine elevated or squamose prominences, rendering the surface rough or prickly; umbo, submarginal, and smooth.

Diameter, ½ an inch.

Locality. Cor. Crag, Sutton, and Ramsholt.

Recent, Mediterranean, Britain, Scandinavia, and North America.

This species, called the prickly Anomia, is very abundant in the Coralline Crag at Sutton, whence all my numerous specimens were obtained. I have not yet seen it from the newer formations. It closely resembles the young of the preceding in most of its characters, but may be distinguished, if not specifically, certainly as a variety, by its sculpture, which is in the form of spinous or squamose radiations. In the recent state, the lower or perforated valve, is said to be generally thin and fragile, and destitute of the aculeated striæ. As the shells found in the Crag are separated or detached, they would not be recognised, if this were always the case; but many of the lower valves are alike ornamented with these markings, though they are less conspicuously so than upon the upper ones. The umbo of this is placed very near the margin, and is generally slightly recurved; the striæ are numerous, although in some specimens they are more distant; but in all they have more or less, the vaulted or raised, and slightly reflected edges, which as it grows produce the series of aculeated or fimbriated striæ upon the exterior, though very faintly exhibited in the variety called *striolata*. In the very young of some of my specimens, the shell appears to be free from sculpture of any kind, and this may favour the opinion of Mr. Clark.

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[*] This, however, was not the position of our shell, which is the upper or imperforate valve, and is quite flat, the lower or adherent one, was probably convex externally, and fixed to the *interior* of some cylindrical body, and to which our specimen must have acted as a lid.

3. ANOMIA PATELLIFORMIS, *Linnæus*. Tab. I, fig. 4, *a—b*.

ANOMIA PATELLIFORMIS. *Linn.* Nov. Act. Upsal., vol. i, p. 42, pl. 5, figs. 6, 7, 1773.
— — *Loven.* Ind. Moll. Scandin., p. 30, 1846.
— — *Alder.* Cat. Moll. North. and Durh., p. 75, 1848.
— — *Forb.* and *Hanl.* Hist. of Brit. Moll., vol. ii, p. 334, pl. 56, figs. 5, 6, 1849.
— — *Middendorff.* Malac. Ross. (Mem. de l'Acad. des Sc. St. Petersb.), p. 521, 1849.
— UNDULATIM STRIATA. *Chem.* Conch. Cab., t. viii, p. 88, tab. 77, fig. 699.
— UNDULATA. *Gmel.* Syst. Nat., p. 33, 46.
— — *Mont.* Test. Brit., p. 157, pl. 4, fig. 6, 1803.
— — *Turt.* Brit. Biv., p. 230, pl. 18, figs. 8, 9, 10, 1822.
— — *Brown.* Illust. Conch. Gr. Brit., pl. 34, figs. 2, 3, 1827.
— — *Flem.* Brit. An., p. 395, 1828.
— — *S. Wood.* Catalogue, 1840.
OSTREUM STRIATUM. *Dacosta.* Brit. Conch., p. 162, pl. 11, fig. 4.
OSTREA STRIATA. *Donov.* Brit. Shells, vol. ii, tab. 45, 1801.
— — *Mont.* Test. Brit., pp. 153, 580, 1803.
— — *List.* Hist. Conch., fig. 36.
Ency. Meth., pl. 171, fig. 16, and pl. 184, figs. 5, 6.

Spec. Char. Testâ suborbiculari, plicis 20—30 *convexis, undulati-radiatis; striis concentricis crebris, sublaminaceis; umbone subprominulo à margine remotiusculo.*

Shell suborbicular, ornamented with 20—30 radiating and undulating ribs; concentric striæ or lines of growth thick and sublaminated; umbo slightly prominent, a little distant from the margin.

Diameter, 1½ inch.

Locality. Cor. Crag, Sudbourn and Sutton.
Red Crag, Sutton, Bawdsey, Walton Naze.
Recent, Britain and Scandinavia.

A few specimens resembling the figure, and corresponding with the description of what the authors of 'Brit. Moll.' have considered as distinct, are in my cabinet, from the Coralline Crag: they consist of the upper valve only, which is somewhat finely striated over the earlier formed part of the shell, while the latter or outer portion is covered with larger and coarser radiations. The umbo is rather more prominent, and placed at a greater distance from the margin than in *Ephippium*, a broad triangular fossette beneath the umbo received the ligament, and the upper valve in my Cor. Crag specimens is nearly flat. A number of specimens of the upper valve, from the Red Crag, present characters by which they may be referred to the above recent species, and are uniform in their exterior markings, having large and undulating ribs or broad and elevated striæ (fig. 4, *a*). This is the only species or variety, that I have been able to obtain from the Red Crag, and those specimens, as might be expected, in that deposit, consist of the upper or thicker valve only; this is pretty uniform in shape, which is nearly orbicular, though the diameter in some is greater from the umbo to the ventral margin, in others it is the reverse.

4. Anomia striata ? *Brocchi*, Tab. II, fig. 3.

Squama magna ? *Chem.* Conch. Cab., t. viii, p. 87, pl. 77, fig. 697.
Anomia striata ? *Broc.* Conch. Foss. Subap., p. 471, t. 10, fig. 13, 1814.
— — ? *Loven.* Ind. Moll. Scand., p. 29.
— — ? *Goldf.* Pet. Germ., t. ii, p. 39, tav. 88, fig. 4, *a—c*.
— — *Phil.* En. Moll. Sic., vol. ii, p. 66, 1844.
— — ? *Forb.* and *Hanl.* Hist. Brit. Moll., vol. ii, p. 336, pl. 55, figs. 1, 6, and pl. 53, fig. 6, 1849.
— rugosa. *Nyst.* Coq. Foss. de Belg., p. 312, pl. 24, fig. 6, 1844.
— squama ? *W. Wood.* Ind. Test., p. 55, pl. 11, fig. 11, 1825.
— — ? *Brocchi.* Conch. Foss. Subap., p. 462, No. 4, 1817.
? Ency. Meth., pl. 171, fig. 22.

Spec. Char. Testá variabile, orbiculata, vel transversè ovatá, discoideá, radiatá; striis creberrimis, imbricato-squamulatis; umbone submarginali.

Shell variable, ovate, orbicular or discoidal; sometimes transversely ovate, covered with numerous radiating, rather rough or imbricated striæ; umbo submarginal.

Diameter, 2 inches.

Locality. Cor. Crag, Sutton, Sudbourn, and Gedgrave.

Recent, Britain and Scandinavia.

A large number of loose valves in my cabinet, from the Coralline Crag, correspond with the figures and description as given of the recent shell under this name, which is, probably, the same as the fossil one figured by Brocchi, although that shell appears to have the umbo rather nearer to the margin. Ours may be described as variable in form, the upper valve sometimes flat, in others convex, covered over with numerous subimbricated striæ, with the umbo a little distant from the edge.

Anomia striata, J. Sow., Min. Conch., t. 425, differs from our shell, in having more numerous and much finer striæ without the roughness of the Crag specimens, and is in all probability distinct; the umbo of the Eocene shell extends to the edge, or very nearly so, and was, probably, not so thick in substance.

These, as before remarked, have been separated into different species by recent Conchologists, but their correct specific distinction cannot be expected in fossils, when the recent forms are so perplexing as to defy determination, or at least to produce great diversity of opinion; it is, therefore, only attempted with the Crag species, to assign them to what is believed to be identity of form or correspondence with those shells which are found in recent seas.

OSTREA, *Linn.* 1758.*

OSTREA. *Lister,* 1686.
OSTRÆA. *Defrance. Swains. Reeve* and *Catlow.*
OSTREUM. *Rumph.* 1705. *Adanson,* 1757.
MYA. *Scopoli,* 1777.
PELORIS and PELORIDERMA. *Poli.* 1791.
DENDOSTRÆA. *Swains.* 1840.

Gen. Char. Shell attached by a part of the larger or lower valve, generally thick and strong, lamellated or foliated, variously shaped, irregular, inequivalved, inequilateral; upper or free valve flat or slightly concave; under or adherent one convex, sometimes strongly marked with radiating, lamellated costæ; hinge without teeth, ligament lodged in a linear depression in each valve semiexternal. Impression of the adductor muscle, large subcentral, that by the mantle entire, generally indistinct, and ill defined.

The animal has the mantle disunited on all sides, with its edges bordered by short tentacular fringes; foot obsolete. Sexes distinct.

The shells of this genus have only one muscular impression, which is always a little inclined to the posterior side. These animals fix themselves by the exterior of the left valve, and the space upon the shell denoting the place of adherence is exceedingly variable in size, depending, probably, upon external causes; in some individuals, the greater part of the entire surface is employed, while in others, this place of attachment is scarcely to be discerned, and occupies only a small portion of the pointed umbo of the shell. The ligament may be considered as external, separating the valves by its contraction when the adductor is relaxed. This ligament takes its rise at the extreme point or umbo of the shell, and advances with the increase of the animal, apparently in an opposite direction to that of the *Dimyaria*, the additions being made in a somewhat sloping direction inclining towards the anterior side, the successive advance is denoted by the lines of increase, as the fresh layers of calcareous matter are deposited by the animal, most distinctly visible in this ligamental area, which may be called tripartite.

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* Etym. *όστρεον,* a fish, (*όστεον*)?

The general substance of the shells of this genus is thick, though they are exceedingly variable in that character, some specimens of the common Oyster possess a solidity of nearly an inch, while others, quite as large, have not a fourth of that thickness.

This is a Marine genus, though many are inhabitants of estuaries, and some will live where the water, at low tide, is not very salt. Its presence, in any formation, is considered to be indicative of its marine nature; none have yet been found as true inhabitants of freshwater. It is a genus of great antiquity, species having been figured from various secondary formations from the lias to the chalk, while some were natives of the Seas during the Eocene Period, all of which have become extinct.

1. **Ostrea edulis**, *Linnæus*. Tab. II, fig. 1, *a*—*c*.

Ostrea. *Lister*. Hist. Conch., lib. iii, fig. 30, A, and fig. 31, 1687.
— *Knorr*. Delices des Yeux, pl. 24**, fig. 2, and pl. 25**, fig. 2, 1766.
— edulis. *Linn*. Syst. Nat., ed. 12, p. 1148, No. 211, 1767.
— — *Poli*. Test. Sicil., vol. ii, p. 169, t. 29, fig. 1, 1795.
— — *Mont*. Test. Brit., p. 151, 1803.
— — *Broc*. Conch. Foss. Subap., p. 562, 1814.
— — *G. B. Sowerby*. Genera, No. 6, fig. 1.
— — *De Blainv*. Man. Malac., pl. 60, fig. 1, 1825.
— — *Crouch*. Int. Lam. Conch., pl. 12, fig. 8, 1827.
— — *Goldf*. Pet. Germ., vol. ii, p. 19, t. 78, fig. 4, *a*—*h*.
— — *S. Wood*. Catalogue, 1840.
— — *G. Sow., Jr*. Conch. Man., fig. 180, 1842.
— — *Phil*. En. Moll. Sic., vol. i, p. 90; vol. ii, p. 64.
— — *Nyst*. Conch. Foss. de Belge, p. 327, pl. 31, fig. 2, *a*, *b*, and pl. 33, fig. 2, *a′*, *b′*, 1844.
— — *Loven*. Ind. Moll. Scand., p. 30, 1846.
— — *Forb*. and *Hanl*. Hist. Brit. Moll., vol. ii, p. 307, pl. 54, and pl. T, fig. 1, 1850.
— pseudo-edulis? *Desh*. Exp. Sc. de. Morée, p. 231, pl. 5, figs. 3, 4.
— deformis. *Parkinson*. Org. Rem., vol. iii, pl. 14, fig. 3, 1811.
— — *Desh*. 2d ed. Lam., tom. vii, p. 229, 1835.
— hippopus. *Desh*. 2d ed. Lam., tom. vii, p. 219, 1835.
— Boblayei? *Desh*. Exped. Scient. de Morea, pl. 3, figs. 6, 7, 1833.
— parasitica. *Turt*. Brit. Biv., p. 204, pl. 17, figs. 6, 7, 1822.
— — *Flem*. Brit. An., p. 392, 1828.
— — *Thorpe*. Brit. Mar. Conch., p. 120, fig. 108, 1844.
— denticulata? *Born*. Mus. Cœs. Vindobon., p. 113, t. 6, figs. 9, 10, 1780.

Ostrea denticulata. *Desh.* 2d ed. Lam., tom. vii, p. 225.
— — *Broc.* Conch. Foss. Subap., p. 568, 1814.
— foliosa. *Broc.* Conch. Foss. Subap., p. 563, 1814.
— ungulata. *Nyst.* Coq. Foss. de Belg., p. 325, pl. 24, fig. 8; pl. 26, fig. 8; and pl. 34, fig. 1, *a*, *a*, *b*, 1844.
— borealis? *Desh.* 2d ed. Lam., tom. vii, p. 220.
— — *Gould.* Inv. Massach., p. 137, 1841.
— spectrum. (*Leathes, M. S.*) Woodward Synop. Tab. Brit. Org. Rem., p. 20, 1830.
— — *S. Wood.* Catalogue, 1840.
— lamellosa. *Goldf.* Pet. Germ., vol. ii, p 18, t. 78, fig. 3, *a*, *b*.
Ostreum vulgare. *Dacosta.* Brit. Conch., p. 154, pl. 11, fig. 6, 1778.
Auricularia maxima. *Dale.* Hist. and Antiq. of Harwich, p. 291, t. xii, fig. 2, 1730.
Ency. Method., pl. 183, figs. 3, 4? pl. 184, figs. 7, 8.

Spec. Char. Testâ variabile, plerumque ovato-rotundatâ, basi subattenuatâ, concentricè lamellosâ, interdum radiato-costatâ, costis imbricatis, undulatis; valvâ superiori planâ.

Shell variable, for the most part of a roundedly ovate form; base of the shell, slightly attenuated, concentrically lamellated, sometimes costated with imbricated and undulated ribs; upper valve flat.

Diameter, 3 inches.

Locality. Cor. Crag, Ramsholt, Sudbourn, Gedgrave.
Red Crag, Passim.
Recent, Britain. North America? Mediterranean?

The earliest appearance of the true edible Oyster seems to have been in the Coralline Crag Period, so far as it is possible to determine a species in this truly variable genus, and its diversified forms were then as great as we see them in the recent shell of the present seas. In the same deposit, at Ramsholt, and in the same bed in close proximity, are two very distinct varieties, from which, as well as from a great dissimilarity of form, solidity of shell, and other differences, it was presumed at the time my Catalogue was drawn up, that they were specifically distinct; but the variety then considered different, and which passed under the provisional name of *spectrum*, corresponds with the recent shell that is now determined by British Conchologists to be only a local variation, and they are, therefore, here united into one species. At Ramsholt there is a complete bed of this shell (*parasitica*), sometimes attached to each other in clusters, or often to the large species of *Balanus*, so abundant in that locality; at this place, also, the thick and ponderous variety (fig. 1, *a*), is occasionally met with, but not in any great profusion; the latter shell is at this place more isolated in its habits and regular in form, and is sometimes marked with nearly obsolete radiating costæ, with a very rugose exterior to the lower or adherent valve, while in the upper valve there are no markings, except the regular lines of growth; in the other variety, there is less appearance of the radiating ribs with a more lamellated exterior, and the shell is much thinner, and less regular in shape, partaking of irregularities produced by its often confined position, the edges of the lower valve of this variety have sometimes a fimbriated character, like what has been called *denticulata,* parts of the larger valve projecting considerably beyond the upper, more especially on each side of the hinge, where the shelly matter is pushed up or elevated, so as to have, in some specimens, the fanciful resemblance to a spectral appearance produced by a person with extended arms beneath a cloth, which suggested the name to the late Rev. G. R. Leathes. The more common variety of the present day, and the one by which our markets are supplied, does not appear in this deposit, at least, there is no specimen in my cabinet strictly resembling that shell, although there is no doubt the specimens figured are mere modifications of the same species.

A detailed description of this common and well-known shell is unnecessary, as the form and appearance of almost every specimen will present some diversity. It may, however, be observed, that in the interior of the upper valve of some specimens of the thick variety, a little within the hinge, is a small indentation or puncture not present in all, and may be often seen in the common variety of the recent shell: for what purpose this is intended or how produced Malacologists have not informed us, as it appears to have been overlooked, probably, as of no importance; it certainly is of no use as a specific determination, as the same may be seen in specimens of a very different species from the deposits of the older Tertiaries. The form of the impression produced by the adhesion of the adductor muscle, it is to be feared, is a character of no great dependence, assuming, as it often does, a variation in shape conforming, in some slight degree, to the outward form or contour of the shell: in the thick variety, this is generally more or less ovate, its longer axis being from the anterior to the posterior side, and slightly contracted in the middle of the upper part, ascending and somewhat pointed towards the posterior; rounded on the lower side, and rather broader on the anterior, or towards the middle of the shell; in the var. *spectrum* or *parasitica,* this mark is as broad as it is long, and of nearly an orbicular or roundedly quadrate form.

A long and interesting history of this species, and of its commercial value, is given by the authors of the 'Hist. of Brit. Moll.,' who consider the English coast as its peculiar province, and although it has a very considerable geographical range, it is nowhere obtained in such great perfection as in our own seas; there is not in that work any notice of this shell, as an inhabitant of the Mediterranean Sea, and it is certainly not given as a living species by Philippi in his 'En. Moll. Sic.,' nor by Payraudeau in his 'Catalogue of Corsican Shells;' but in Poli's splendid work 'Test. utrius. Sicil. 1795,' is figured and described a group of shells, as well as the animal, of what appears to belong to this species, and from the general accuracy of that observant author, there is very little doubt the specimens were procured in those seas. From the List of Synonymes, it will be seen, that several authors have given this as a fossil from the newer Tertiary formations of that part of the world, where it has been considered by many to be no longer in existence; and the fossil from the Morea, described by Deshayes as a new species, under the name of *O. Boblayei*, does not appear from the representation to be more than a modified form of our very variable shell; and for my own part, I am much inclined to believe, that Poli was correct, and that it is still an inhabitant of the Mediterranean, as a specimen evidently of this species was lately shown to me by Professor E. Forbes, said to have been obtained by Mr. M'Andrew, very near to Gibraltar. The common Oyster of North America, called *O. borealis*, by Lamarck, which differs very materially in its varieties, is still considered by some Conchologists as doubtfully distinct. Dr. Gould says, 'Invert. Massach.,' p. 138, "The Oystermen maintain that our shell is identical with the English *Ost. edulis*, and there are certainly forms in which the American and European specimens could not be distinguished;" and although this is described by that gentleman under the name of *borealis*, it was evidently his impression also, that it was not specifically distinct, as *Ost. edulis*, Linn. is enumerated in his synonyma. A fossil species, also, from the upper Tertiaries of America, figured and described by Conrad under another name, so strongly resembles our species, as to excite suspicion that it is not really different. It is, however, exceedingly difficult in this, perhaps, more so than in most others, to determine its specific limitation, and every species in this genus seems to possess the character of deviating in a great degree from what might be called its typical form. Sir Charles Lyell, in his 'Second Tour to the United States,' vol. i, p. 312, speaks of the Virginian oyster (*Ost. Virginica*), as resembling the British shell, when it lives isolated and grows freely under water, but that it loses this more rounded form, and becomes greatly lengthened, when living gregariously on banks between high and low water-mark. Our own oyster will assume a variety of forms, dependent principally upon its peculiar position, but no amount of confinement or lateral pressure will train it into the elongated shape of the Virginian shell.

I believe, however, the range of this species in the living state may be said to extend from the Mediterranean to the North-Eastern Coast of the United States, although it appears to have selected, for its more favoured abode at the present day, the seas of our own Island.

The portions of the formation belonging to the Mammaliferous Crag Period have not, to my researches, yielded this species, nor is it enumerated as amongst the Estuary shells of the Norfolk Beds, by Woodward.

2. **Ostrea princeps**, *S. Wood.* Tab. I, fig. 1, *a—b*, and Tab. II, fig. 2, *a—b*.

Ostrea undulata. *Nyst.* Coq. Foss. de Belg., p. 324, pl. 24, fig. 7 *a*, and pl. 26, fig. 7 *b*, 1844, (not J. Sowerby).

Spec. Char. Testâ magnâ, crassâ, rotundatâ; valvâ sinistrâ convexâ, costatâ, costis numerosis elevatis, radiantibus, divaricatis, concentricé undato-plicatis; valvâ superiori planâ, obsoletè costatâ.

Shell large, thick, and rounded; left or lower valve convex, ornamented with numerous, elevated, radiating and bifurcating costæ, lines of growth or concentric laminæ of an undulate or waving form, slightly reflected over the ribs; upper valve flat, with faint depressed, or nearly obsolete rays.

Diameter, five inches.

Locality, Cor. Crag, Sutton, Ramsholt, and Sudbourn.
Red Crag, Sutton, Newbourn, and Bawdsey.

This elegant shell was obtained by my friend, W. Whincopp, Esq., of Woodbridge, who has kindly permitted me to have it figured; a similar specimen, though not quite in so great perfection, is in the handsome museum recently erected by the liberal inhabitants of the town of Ipswich; two or three more of the same dimensions are in the possession of E. Acton, Esq., of Grundisburgh, and these with another in the Cabinet of J. S. Bowerbank, Esq., constitute the whole that I have seen of that magnitude.

Such specimens appear to be very rare, as it was never my lot to find so large a one during my researches in the Crag of Suffolk, although the same shell, in its younger state (fig. 2 *b*), has been for many years in my cabinet, and from its presenting characters in that condition, by no means distinct, it was considered only as a variety of *edulis*, but the deeply sculptured markings, so well displayed in the specimen figured, seem to justify its being considered as a different species, although it must be confessed, the gradations of alteration between the young of this, and some of the varieties of the common edible species, are so trifling, that the line of separation cannot satisfactorily be pointed out. There are, in this genus particularly, perplexities in specific determination, so that no diagnosis can be given of any one species that is not liable to serious deviation, and the present name is assigned provisionally, from the apparently marked difference in the adult state, and which, if it be not specifically distinct, its elegance, a rather uncommon character in this genus, will entitle it to be ranked as a marked and peculiar variation, worthy of a distinguishing appellation.

A slightly sinuated form is visible on the posterior side, where the costæ also appear more particularly to have a divaricating character. Upon the young shell the radiating ridges or costæ are but few in number, and by no means prominent or distinct, appearing then strongly to resemble the *edulis*; as it enlarges, the differences become more visible, the rays being prominent and regular. The edge or inner margin of the shell is deeply indented with a slightly reflected edge, thus producing the sub-lamellated costæ of the exterior. One peculiarity, observable in this shell, is the very small portion of surface by which it was attached, its own substance and weight seeming sufficient security against displacement by the movement of the water.

The form of its muscular impression is elongato-ovate across the shell, differing in no respect in that character from the form displayed by the same muscle in specimens undoubtedly belonging to *edulis*. The upper valve is quite flat, very thick, and only faintly marked with radiations, scarcely visible in the younger state, and on each side of the ligamental area, upon the edge of the shell, are some denticulations like those visible upon the same valve of *edulis* in the same place.

HINNITES.* *De France,* 1821.

HINNITA. *Ferussac.* 1821. *Gray,* 1826.
HINNITES. *J. Sow.* 1827.
HINNUS. *J. Sow.* 1835.
HYNNITES. *Herrn.* 1846.

Generic Character. Shell inequivalve, subequilateral, more or less ovate, thick, and strong, covered externally with somewhat irregular, squamose, or radiating costæ. Valves eared with a deep and elongated area for the ligament or cartilage, which is wholly internal; a large ovate impression by the adductor muscle, that by the mantle entire.

ANIMAL UNKNOWN.

This genus was first established by M. de France, in the 'Dict. des Sci. Nat.,' tom. xxi, p. 169, upon a fossil species, which appeared to unite the characters of the two genera, Ostrea and Pecten, differing from the former in adhering by its outer surface, only in its older state, and by the opposite valve: while in the young it was probably fixed by a byssus. It has, by some authors, been united with Pecten since one species of that genus (*P. pusio*), is in the young state fixed by a byssus, but when more grown, becomes attached by the outer surface of its right valve in the same manner. This peculiar habit is here considered as alone insufficient for excluding the present genus, as the extreme solidity of two or three fossil species of typical characters, with a peculiar form in the muscle mark, seem to indicate a difference in the animal inhabitant sufficient to remove them from Pecten.

In the juvenile state the form of the shell is very similar to that of Pecten with its projecting auricles, and an opening or sinus beneath the anterior one in the right valve through which, in all probability, there issued a byssus; as it advanced in age its habits became altered, when it fixed itself by the outer surface of its valve. This same habit is adopted by *P. pusio* in the recent state, though not so in the fossil form of what is considered as the same species in the Crag Formations, where they never became attached by the exterior of the shell, but always preserve their regularity or partial freedom. The exterior of the shells in this Genus have not the regularly radiating form of striæ or costæ, so characteristic of the Pectens or fans, but they are ornamented with arched or lamellated fringes or squamose appendages, more resembling the exterior of Spondylus, to which they appear to have considerable affinity, and, indeed, may be considered as a connecting link between Ostrea and that Genus, differing from the former in having distinct auricles in the young state, and in adhering by a different valve; and from the latter, in the absence of those dental characters prominently exhibited in Spondylus.

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* Etym. ἵννος, hinnus, vel ὕννος, vomer, sec, Herrm.

A few species only are at present known, and those all in a fossil state; two or three are peculiar to the Tertiary Formations, and one has been figured by Mr. Sowerby in 'Min. Conch.,' from the Inferior Oolite of this country.

1. Hinnites Cortesyi, *De France.* Tab. III.

Hinnites Cortesyi. *De France.* Dict. des Sci. Nat., t. 21, Art. Hinnites, p. 169, Atlas, fig. 1, 1*a*, 1821.
— — *De Blainv.* Malac., pl. 61, fig. 1, 1825.
— — *Desh.* 2d edit. Lam., tom. vii, p. 150, 1836.
— — *Chenu.* Ill. Conch. Hinnites, pl. 1, fig. 4.
— Cortesianus. *De Blainville.* Dic. des Sci. Nat., t. 32, 311, 1824.
— Dubuissoni. *J. Sowerby.* Min. Conch., t. 601, 1829.
— — *Woodward.* Syn. Tab. of Org. Rem., p. 20, 1830.
— — *Id.* Geol. of Norf., p. 44, 1833.
Hinnus Dubuissoni. *J. Sow.* Syst. Ind. to Min. Conch., p. 244, 1835.
— — *S. Wood.* Catalogue, 1840.
— — *J. Morris.* Catal. Brit. Foss., p. 110, 1843.

Spec. Char. Testâ magnâ, ovatâ, depressâ, crassâ, radiatim et undulatim costatâ; transversim squamoso-lamellosâ; auriculis inæqualibus; sulco cardinali, prælongo, et profundo.

Shell large, ovate, depressed, thick, and strong, with radiating and undulating costæ; ribs covered with squamose projecting lamellæ; auricles unequal; and a deep and elongated sulcus for the ligament.

Length, 5 inches. *Height,* 6 inches.

Locality, Cor. Crag, Ramsholt.

Although a shell of great strength and solidity, it is by no means abundant as a British fossil, and I have seen it only from one locality, and that in the Coralline Crag. The specimen now figured was from a less disturbed part of that deposit, where the two valves of many of the Bivalvia are found in their natural position; while the one figured in 'Min. Conch.' was from a single valve. A few other specimens were obtained by W. Colchester, Esq., from the same spot, and these constitute all that I have as yet seen.

A perfect representation of the Genus Pecten is exhibited in the young shell, and it must then have been difficult to have pointed out a character by which it could be considered as belonging to any other; there is, however, even in that state an irregularity in the arrangement of the rays, which are at rather unequal distances, and have indications of the squamæ that so prominently ornament the adult shell.

When full grown its true characters are displayed, and no mistake can, I think, then arise respecting its generic distinction from that of Pecten. Our shell is nearly of an oval form, having its height or diameter from the umbo to the ventral margin, one sixth more than in a contrary direction. The lower or adherent valve is rather the deeper of the two, while the upper or left valve is nearly flat; the latter is ornamented with numerous undulating rays at somewhat irregular distances, amounting to as many as forty in one specimen, and these are elevated and arched at different periods of growth, giving a roughened file-like appearance to the exterior; on the other valve the rays are fewer, less regular, and the imbricated squamose appendages larger and more prominent, resembling in that character the common Oyster. The hinge-line in the adult shell is nearly straight, having an elongated and deep sulcus for the ligament, enlarging downwards, and slightly visible externally at the umbo; this is placed a little on the posterior side of the centre, giving a slight inequality to the auricles, the anterior one being of course the larger; the muscle mark is of an enormous size, occupying nearly half the length of the shell, while the diameter of it in the other direction is rather less.

In assigning the Crag shell to H. Dubuissoni, Mr. J. Sowerby says he was guided to that determination by the description only, and having seen but one valve, thought the comparison suited better with the shell from the older Tertiaries than with the other species described by M. De France. I regret exceedingly not having been able to obtain, for comparison, a specimen of either of the two species described by M. De France, and the dependence here is also based upon an insecure foundation. I feel, however, more disposed to refer our shell to *H. Cortesyi*, as well from what appears a greater correspondence in their external characters having both valves for our guidance, as also from the age of the formations in which they were obtained; and as no new name is imposed, the simple alteration is a matter of no great importance should it hereafter be found to be erroneous.

Pecten.* *Pliny, Aldrov,* &c.

Pecten. *Chem.* 1784. *Bolten,* 1798.
Pandora. *Megerle,* 1811.
Janira. *Schum.* 1817.
Neithea. *Drouet.* 1824.
Janera. *G. B. Sow. Jr.* 1842.—*P. maximus.*
Pecten. *Rumphius,* 1705. *Browne,* 1756. *Chem.* 1784.
Ostrea (sp.). *Linn.*
Argus (sp.). *Poli.* 1795.
Chlamys (sp.). *Bolten,* 1798.

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* Etym. :— Pecten, a comb.

Amusium (sp.). *Chem.* 1784.
Palliolum. *Id.* -
Pyxis. *Id.* -
Pera. *Id.* - —*P. opercularis.*
Pallium. *Martini,* 1773. *Schum.* 1817.
Dentipecten. *Rüppell,* sec. *Gray.*
Decadopecten. *Rüppell,* sec. *Swains.*
Pseud-Amusium. *Chem.* 1784.—*P. tigerinus.*
Amusium. *Rumph.* 1705. *Chem.* 1784. *Schum.* 1817.
Pleuronectes. *Schlotth.* 1820.
Pleuronectia. *Swains.* 1840.—*P. Gerardii.*

Generic Character. Shell ovate, or suborbicular, subequilateral, inequivalve, with a projecting, generally unequal auricle, on each side of the umbo, surface rayed with striæ, or more or less elevated costæ; beaks approximate and acute. Hinge with a linear groove across the dorsal part of the auricles for the ligament, and a triangular pit or fossette beneath the umbo for the cartilage. Muscular impression of the mantle entire but ill defined; adductor large, excentric.

Animal resembling the shell without the auricular appendages, its mantle disconnected on all sides; the margins bearing generally two rows of tentacular filaments, at the base of which are arranged a series of ocelli or rudimentary eyes; foot small, subcylindrical, containing a groove from which is spun a byssus for its attachment; one large and powerful adductor muscle; no siphonal tubes. Sexes united.

This is a well and strongly-marked genus, generally ornamented with rays, like the expanded sticks of a lady's fan: these in some species are large and highly elevated, while in the more aberrant forms they are nearly obliterated, merging into some which are perfectly smooth, the gradations from the one to the other are so imperceptible as to be without any definable line of demarcation, and although this group has been separated into several Genera, there is no good or permanent character by which they can be distinguished.

In some, the valves are very unequal in size, while in others there is scarcely a perceptible difference, though in most species, by close observation, a trifling inequality may be detected. Those, in which one valve is very convex, while the other is flat, or even concave in its young state, have mostly the larger one buried in the sand, resting in a horizontal position, so that the flat one opens upwards, like the lid of a box, these, when young, are furnished with a byssus, the opening for which is visible in the smaller shell, but becomes obliterated in the adult. The animal probably, in all the species, is capable of producing a byssus for attachment, this, however, is mostly made use of by the young, as when more advanced in growth it appears to be possessed of a considerable degree of locomotive power, which is often employed so as to make considerable progress through the water by means of its large and powerful adductor after opening the valves, and flapping them suddenly together with great rapidity; some species are probably always stationary, as we find at all ages an opening in one valve through which a byssus of considerable magnitude might have passed; others fix themselves to rocks or foreign bodies by the spinous or imbricated processes of their valves; when fixed like *P. pusio*, it is by the right valve, which is also the one wherein is left an opening for the byssus, and the one also like *P. maxima*, which the animal buries in the sand, it may, therefore, always be considered the lower valve: this is sometimes the most convex, while in those that are free, the greater convexity is generally in the left or upper valve, which, in the living shell, is the more highly coloured.

This is purely a marine genus, and in the recent state has a very extended geographical distribution, being found in almost all parts of the world, while its vertical range is also considerable, inhabiting the seas at various depths; it is also of great antiquity, species having been found as low in the Secondary Series as the Lias, and are continued upwards through nearly every period to the present time; it is largely developed in the newer Tertiaries, and is exceedingly abundant as an existing genus, upwards of a hundred species being already known. It has been quoted as an inhabitant of the Palæozoic Period, but the specimens found in the Coal Measures and Mountain Limestone Rocks, present differences that are considered as generically distinct, and they have been separated by Prof. M'Coy under the name of *Aviculopecten* differing from the true Pectens in the absence of a cartilage-pit, and in the inequalities of the auricles being reversed, thereby connecting it with Avicula.

It is to be feared, that many of our Tertiary specimens have been erected into species without sufficient claim to such distinction, and that several will be found upon further examination to be merely variations of form and sculpture of those which are perhaps more than commonly disposed to deviate from what may be considered as the typical form of long and well-known recent species.

This genus flourished most abundantly in the Crag Seas, and the modifications in the ornamental portions of most of the species render their correct appropriation a task of no ordinary difficulty.

1. Pecten maximus, *Linnæus*. Tab. IV, fig. 1, *a—b*, and Tab. VI, fig. 7, *a—b*.

Lister. Hist. Conch., lib. iii, par. 1, fig. 1 A, 1687.
Ostrea maxima. *Linn.* Syst. Nat., p. 1144, No. 185, 1767.
— — *Knorr.* Delices des Yeux, xiv*, fig. 1, 1766.
— — *Donov.* Brit. Shells, pl. 49, 1800.
— — *W. Wood.* Ind. Test., p. 47, pl. 10, fig. 1, 1825.
— — *Broc.* Conch. Foss. Subap., p. 572, No. 16, 1814.
Pecten maximus. *Mont.* Test. Brit., p. 143, 1803.
— — *Chem.* Conch. Cab., vii., p. 268, pl. 60, fig. 585, 1782.
— — *Crouch.* Int. Lam. Conch., p. 20, pl. 12, fig. 13, 1827.
— — *Brown.* Illust. Conch. Gr. Brit., pl. 32, fig. 1, 1827.
— — *Desh.* 2d ed. Lam., t. vii, p. 129, 1836.
— — *Payr.* Cat. Moll. Cors., p. 71, No. 132, 1826.
— — *S. Wood.* Catalogue, 1840.

PECTEN MAXIMUS. *Chenu.* Illust. Conch. Pecten, pl. 2, figs. 1—3, and pl. 29, figs. 1—18.
— — *Loven.* Ind. Moll. Scand., p. 30, 1846.
— — *Alder.* Cat. Moll. North., p. 76, 1848.
— — *Forb.* and *Hanl.* Hist. of Brit. Moll., vol. ii, p. 296, pl. 49, 1849.
— — *Sismond.* Syn. Meth. An. Invert. Pedem. Foss., p. 13, 1847.
— — *G. B. Sow. Jr.* Thesaur. Conch., vol. i, p. 45, pl. xv, figs. 98-100, 1847.
— VULGARIS. *Da Costa.* Brit. Conch., p. 140, pl. 9, fig. 3.
— COMPLANATUS. *J. Sow.* Min. Conch., t. 586, 1828.
— — *S. Wood.* Catalogue, 1840.
— — *J. Morris.* Cat. Brit. Foss., p. 114, 1843.
— — *Nyst.* Coq. Foss. de Belg., p. 285, pl. 22 bis, fig. 1, *b*, *b'*, 1843.
— SIMILIS. *G. B. Sow. Jr.* Thes. Conch., p. 46, pl. 16, figs. 116, 117, 1847.
— MEDIUS. *Chem.* Conch. Cab., t. vii, p. 272, t. 60, figs. 586, 587, 589.
— — *Desh.* 2d ed. Lam., t. vii, p. 130, 1835.
— — *Phil.* En. Moll. Sic., vol. ii, p. 59, 1844.
— — *Chenu.* Illust. Conch., pl. 4, figs. 2—6.
— — *Sismonda.* Syn. Meth. Ped. Foss., p. 13, 1847.
— GRANDIS. *J. Sowerby.* Min. Conch., t. 585, 1828.
— — *S. Woodward.* Syn. Tab. Brit. Org. Rem., p. 19, 1830.
— — *S. Wood.* Catalogue, 1840.
— — *J. Morris.* Catal. Brit. Foss., p. 114, 1843.
— — *Nyst.* Coq. Foss. de Belg., p. 284, pl. 21, fig. 6, *b*, *b*, and pl. 22, fig. 1, *a*, *b*, 1844.
Ency. Meth., pl. 209, fig. 1, *a*, *b*.

Spec. Char. Testâ inæquivalvi, suborbiculari; valvâ dextrâ vel inferiori convexâ, superiori planulatâ; radiis magnis, 13—14 *rotundatis, longitudinaliter striatâ; marginibus lati-crenulatis; auriculis æqualibus.*

Shell inequivalved, suborbicular; right or inferior valve convex; left or upper valve flat, or very slightly inflated; ornamented with 13 or 14 large, rounded, and striated ribs or rays; margin broadly indented; ears equal.

Length, $5\frac{1}{4}$; *height,* $4\frac{3}{4}$ inches.

Locality, Cor. Crag, Sutton, Aldbro', Ramsholt, Gedgrave.
Red Crag, Sutton, Bawdsey.
Northern Drift, Ireland (Forbes).
Recent, Britain and Northern Seas, Mediterranean? Red Sea?

This is very abundant in some localities of the Coralline Crag, and particularly variable in its exterior ornament. The peculiar arrangement of the striated portion of the rays, which some of the specimens have assumed, induced authors who have described the Crag shell, to consider it as wholly distinct from the recent British species, and I was long of the same opinion; but the examination of numerous specimens in the cabinets of my Crag collecting friends, has shown a union between the extremes of sculpture, as represented in the variety *grandis,* and that which is commonly exhibited in the generality of recent specimens, by small and almost imperceptible variations, so as to prevent a distinct line of demarcation to be drawn between them, and as such, they are here considered only in the light of varieties of the living British shell.

M. Nyst, seems to consider the variety *grandis* as a modified form of *P. Jacobæus*, from which opinion I must dissent, believing it to be, as above stated, specifically united with our own species *P. maximus*. In *P. Jacobæus*, the costæ or rays are broader in proportion to the intermediate depression, and are more quadrate: those upon the Crag shell are often as much elevated, but always more or less rounded, without the abrupt or sharp edges, which distinguish the Mediterranean shell. The most prominent character in the var. *grandis*, is the distinct ray in the centre of the depression, while a corresponding kind of sulcus or furrow runs down the centre of the large ray, dividing it into two parts; this character, which in some specimens appears so strongly marked, that it alone would be quite sufficient for specific distinction, becomes in var. *complanatus* scarcely discernible with the rays very much depressed, and in those specimens with this division in the rays, each side appears to be again divided by a less distinct line, or arranged in pairs. *P. medius. Chemn.* is said, by its author, to be intermediate between *Jacobæus* and *Maximus*, partaking, in some degree, the characters of both, but from the figure and description appears to be only a variety of the latter.

A species from Australia, somewhat resembles our Crag fossil, in having the intermediate small ray, but it has no bipartite division of the large rays, while they are rounded and simple on the flatter or upper valve, and may, therefore, only be looked upon as the representative of our species. In the young state, our shell is nearly smooth, while the upper or left valve is concave on the upper surface, in which stage of its existence it was probably furnished with a byssus, as an opening is then visible beneath the auricle of the convex or right valve, but entirely obliterated in the adult shell.

In the Coralline Crag at Ramsholt, many beautiful specimens have been found with the valves united, in what was, probably, a deeper portion of the sea at that period, in association with *Pyrula*, *Pholadomya*, *Lingula;* forms, now found only in Tropical or Sub-Tropical Seas, while at the same locality are numerous individuals of species, whose homologues are living at the present day upon the Scandinavian Coast.

The range of this species (*maximus*), in the living state, is given by the authors of the 'Hist of Brit. Moll.,' from the Coast of Norway to Gibraltar. Payraudeau quotes it as found, though rarely, on the West Coast of Corsica; and Born speaks of it also as from the Mediterranean.

2. Pecten Gerardii, *Nyst.* Tab. V, fig. 5, *a—b.*

Pecten Gerardii. *Nyst.* Rech. Coq. Foss. Prov. d'Anv., p. 19, No. 75, pl. 3, fig. 75, 1835.
— — *Potiez. et Mich.* Cat. des Moll. de Douai, t. 11, p. 78, No. 32, 1844.
— — *Nyst.* Coq. Foss. de Belg., p. 300, pl. 18, fig. 11, 1844.
— subdiaphanus. *S. Wood.* Catalogue, 1840.

Spec. Char. Testâ orbiculari, subhyalinâ, inæquivalvi, equilaterali, radiatim striatâ, et divaricatim insculptâ; auriculis inæqualibus; margine tenuissimè crenulatâ.

Shell orbicular, subpellucid, inequivalved or somewhat plano-convex, equilateral, externally covered with fine longitudinal rays, visible only near the margin, and beautifully sculptured with diverging or divaricating striæ, auricles unequal.

Diameter, 2 inches.

Locality. Cor. Crag, Ramsholt, Sudbourn, and Gedgrave.

This beautiful species is exceedingly abundant at the latter locality, where, however, the valves are always separated. At Ramsholt, they are somewhat less abundant, and the valves are there found in their natural position.

From the figure and description given by M. Nyst, above referred to, there is little doubt, that the English Crag shell is the same as the one found in the Campinian beds of Belgium. Our shell is very thin, but strong, with irregularly-marked lines of increase; the right valve always more or less flattened, while the opposite one is tumid or convex. Auricles very unequal and rayed, or costated, with a moderate sized opening beneath the anterior one of the right valve, this is almost obliterated in the adult shell, a rather large triangular cartilaginous area overhanging or projecting into the interior. The impression formed by the edge of the mantle parallel with the margin, and extending to about two thirds the length of the shell, that by the adductor, less distinctly defined. The contour of the shell is nearly circular, a little interrupted with a pair of rather high shoulders. A dark line diverges from the umbo, within which the shell is of a lighter colour, like that in *P. corneus*, being, however, perfectly distinct from that species. The beautifully curved or divaricating striæ (from the absence of longitudinal or radiating ribs), are visible upon the smooth surface of the shell with the naked eye. An American fossil, *Pecten Virginianus*, Conrad. 'Foss. of the Med. Tert. of the United States,' p. 46, pl. 21, fig. 10, 1838, appears to resemble our shell in many characters, but from the representation it differs in being longer than high, and has the ears more equal and larger.

3. **Pecten similis**, *Laskey*. Tab. V, fig. 4, *a—c*.

Pecten similis. *Laskey*. Mem. Wern. Soc., vol. i, p. 387, pl. 8, fig. 8, 1811.
— — *Brown*. Illust. Conch. Gr. Brit., pl. 32, figs. 5, 6, 1827.
— — *Flem*. Brit. An., p. 384, 1828.
— — *Forb*. Rep. on Egean Invert., p. 183, 1848.
— — *Alder*. Cat. Moll. North. and Durh., p. 77, 1848.
— — *Forb*. and *Hanl*. Hist. Brit. Moll., vol. ii, p. 293, pl. 52, fig. 6, and pl. S, fig. 1, 1849.
Ostrea tumida. *Turt*. Conch. Dict., p. 132, 1816.
Pecten tumidus. *Turt*. Brit. Biv., p. 212, pl. 17, fig. 3, 1822.
— — *Flem*. Brit. Anim., p. 384, 1828.
— — *Thorpe*. Brit. Mar. Conch., p. 117, 1844.
— — *S. Wood*. Catalogue, 1840.
— — *Lovén*. Ind. Moll. Scand., p. 36, 1846.
— — *G. B. Sow., Jr*. Thes. Conch., vol. i, p. 57, pl. 13, figs. 27—29, 1847.
— pygmæus? *Phil*. En. Moll. Sic., vol. ii, p. 61, 1844, (not *Goldf.*)

Spec. Char. Testá minutá, suborbiculatá, æquivalvi, subæquilaterali, tenui, subhyaliná, planulatá, glabrá; auriculis subæqualibus, in valvá dextrá anticè longiori, rotundatá, posticè rectangulatá; sinu brevi, acuto.

Shell small, suborbicular, equivalved, subequilateral, thin, subpellucid, flattened, smooth; auricles nearly equal; the anterior one of the right valve rather the longer and rounded, on the posterior side it forms a right-angled triangle, with a short and acute sinus.

Diameter, ¼ inch.

Locality. Cor. Crag, Sutton. Recent Britain, Finmark, Ægean Sea.

This pretty little shell is particularly abundant at Sutton, in the Coralline Crag, to which formation, as far as is at present known, it is restricted: its minuteness and fragility may, however, be one cause why it has not yet been found in the Red Crag, as it appears to be a species possessed of capabilities to endure a considerable range in temperature, being quoted by Dr. Lovén as having been obtained on the coast of Finmark, while Professor Forbes procured it in considerable numbers from a great depth in the Ægean Sea, some specimens of which he has obligingly given me, for the purpose of comparison with the British fossil.

There are some slight differences between the recent shell and the fossil, but which can hardly be considered of sufficient importance to justify it being ranked as more than a variety; the living species in several characters is subject to variation. The specimens from the Ægean, which were obtained at the depth of 100 fathoms, are rather larger than any I have from the Crag, measuring a little more than a quarter of an inch in its longitudinal diameter, and a trifle less in the height, with the auricles unequal, the anterior one, more especially in the right valve, less than the posterior, but this is not a permanent character, as in some specimens they are equal in size. The Crag shell does not exceed in diameter a quarter of an inch, very rarely attains this magnitude, and the dorsal margin, or rather the ears of the shell, extend to 5-6ths of its entire length. In the right valve the anterior auricle is as large as the posterior one, and completely rounded with a small sharp sinus beneath it, as if the shell, in the living state, had been supplied with a byssus. There is a slight peculiarity in this species in the right valve, attributable probably to the presence and size of the byssus; the diverging line from the umbo is on the posterior side rather convex, while on the opposite, or beneath the projecting ear, it is distinctly concave; in the left valve the auricles are equal in size, and the divergence of the edge of the shell more regular, forming an angle of 90°; this valve is, in the recent state, ornamented with coloured markings of a zigzag, or what is called Vandyke shape, traces of these colours are still remaining in some of the Crag specimens, one of which has only a single line of divergence from near the centre, somewhat like the ornaments upon *Lucina divaricata.* There is also a slight inequality in the depth or convexity of the valves, the right or lower one being a little more tumid than the other.

P. Groenlandicus, Lovén and G. B. Sow., Thes. Conch., p. 57, Pl. 13, fig. 40, appears to differ from our shell only in being somewhat larger.

4. **Pecten tigrinus,** *Müller.* Tab. V, fig. 2, *a—g.*

Pecten tigrinus. *Müll.* Zool. Dan., ii, p. 26, pl. 60, figs. 6—8, 1776.
— — *Desh.* 2d ed. Lam., t. viii. p. 155, 1835.
— — *Nyst.* Coq. Foss. de Belge, p. 303, pl. 23, figs. 4—10, 1844.
— — *Lovén.* Ind. Moll. Scand., p. 31, 1846.
— — *Alder.* Cat. of Moll. North. and Durh., p. 77, 1847.
— — *Forb.* and *Hanl.* Hist. of Brit. Moll., vol. ii, p. 285, pl. 50, figs. 8—11.
— obsoletus. *Penn.* Brit. Zool., vol. iv, p. 322, t. 64, fig. 3.
— — *Don.* Brit. Shells, vol. i, t. i, fig. 2, 1799.
— — *Mont.* Test. Brit., p. 149, and sup., p. 57, 1808.
— — *Turt.* Brit. Biv., p. 213, pl. 9, fig. 6, 1822.
— — *Brown.* Illust. Conch. Gr. Brit., pl. 33, fig. 6, 1827.
— — *J. Sowerby.* Min. Conch. t. 541, figs. 1—8, 1828.
— — *Nyst.* Rech. Coq. Foss. d'Anv., p. 19, No. 74, 1835.
— — *S. Wood.* Catalogue, 1840.
— — *J. Morris.* Cat. of Brit. Foss., p. 115, 1843.
— — *Thorpe.* Brit. Mar. Conch., p. 118, 1844.
— parvus. *Da Costa.* Brit. Conch., p. 155, 1778.
— lævis. *Penn.* Brit. Zool., vol. iv, p. 102.
— — *Mont.* Test. Brit., pp. 150, 579, pl. 4, fig. 1, 1803.
— — *Turt.* Brit. Biv., p. 212, 1822.
— — *Brown.* Illust. Conch. Gr. Brit., pl. 33, fig. 7, 1827.
— domesticus. *Chem.* Conch. Cab., t. xi, p. 261, pl. 207, figs. 2030—2036, 1783.
Ostrea obsoleta. *Turt.* edit. Linn., vol. iv, p. 266, 1806.
— — *W. Wood.* Ind. Test., p. 50, pl. 10, fig. 37.
— — *Mawe.* Linn. Conch., pl. 14, fig. 6.
— tigerina. *Turt.* edit. Linn., vol. iv, p. 268, 1806.
— lævis. *Mat.* and *Rack.* Linn. Trans., vol. viii, p. 100, pl. 3, fig. 5, 1807.
— — *W. Wood.* Ind. Test., pl. 10, fig. 38.

Spec. Char. Testá æquivalvi, æquilaterali, suborbiculari; radiatá, radiis variis, interdum obsoletis, striis subtilissimis arcuatim divergentibus ornatá; auriculis valdè inæqualibus.

Shell equivalve, equilateral, suborbicular; costated costæ variable, sometimes obsolete, or small and numerous, sometimes arranged in fives; ornamented with fine curved and diverging striæ, ears very unequal.

Diameter, 1 inch.

Locality. Cor. Crag, Sutton, Ramsholt, Gedgrave, Sudbourn.
Red Crag, Sutton, Bawdsey, and Walton Naze.
Recent, Britain and North Seas.

This is a very abundant species in the Coralline Crag, with as great a range in variation as is exhibited by those obtained in our own seas at the present day. In the Red Crag, specimens are much more scarce, although var. δ I have seen only from this Formation.

From the great diversity of forms displayed by this animal, it is not to be wondered at, that it should have been separated into several species: with variations exceeding in appearance what are generally considered as sufficient for specific distinction, there is no permanent character that will justify their separation. In the Crag as well as in the recent state, specimens may be obtained presenting every minute gradation, and these apparently different forms are now justly included under one name.

In var. *a* the shell is nearly smooth (*lævis, Penn.*), or at least without any distinct longitudinal ribs or striæ, or with the edges only presenting these radiations; this may be considered as one extreme of the species, while the other variety exhibits five large elevated ridges or ribs; these are generally separated, and in pairs, though they are sometimes simple, the intermediate spaces are filled up with three or more rays. Var. β may be called lenticular, with numerous fine rays covering the entire surface, sometimes single, sometimes in pairs; var. γ has four or five raised ribs, as before described; var. δ has from seven to nine rays, which are themselves faintly striated, while the intermediate spaces are also filled with radiating lines; but these forms are not permanent, and specimens uniting some of the characters of each may be commonly obtained. Every specimen is strongly marked with fine divaricating striæ, in a curving direction from the umbo to the sides. In the young state the shell is often very scabrous, the rays being covered with regularly raised imbrications. The general form may be described as suborbicular, though the greater diameter is from the umbo to the ventral margin. The auricles may be considered its most distinguishing character; these are very unequal, the posterior one small, nearly obsolete, while that on the anterior side is large, generally costated, or coarsely rayed. In the early stages of its growth, the shell is always regularly convex or lenticular, but in some specimens, when at a certain size, its form is altered by the enlargement of the shell on the inner edge of the margin instead of outwardly, so as to give a greater space to the interior without much increasing the diameter of the shell, and this character is exhibited in both valves. Fig. 2, *g*, is what in my Catalogue was enumerated with doubt as a new species, under the name *exoletus*, but which probably is only a giant monstrosity of this species, as the ordinary form is well displayed on the outside, beyond which, by apparently an extra effort of growth, it has induced a deposit of calcareous matter, till it has reached a diameter of 1½ inches, thus much exceeding the general size of this species, which is rarely more than one inch. Fig. 2, *a*, is from a specimen belonging to Mr Bridgman, obtained in the Mammaliferous Crag, near Norwich.

The animal in the recent state is said to range from 12 to 60 fathoms, while 18 or 20 is its most favorite depth.

5. **Pecten Bruei**, *Payraudeau.* Tab. V, fig. 3, *a—b.*

Pecten Bruei. *Payr.* Cat. Moll. de l'Ile de Corse, p. 78, pl. 2, figs. 10—14, 1826.
— — *Desh.* Append. Lyell's Princ., vol. iii, p. 14, 1833.
— — *G. B. Sow., Jr.* Thesaur. Conch., vol. i, p. 70, pl. 20, figs. 241-2, 1847.
— — *Chenu.* Illust. Conch. Pecten, pl. 39, fig. 6, *a—c.*
— Pictus. *Goldf.* Pet. Germ., vol. ii, t. 97, fig. 4, *a—c,* 1830 (not *Da Costa*).
— striatus? *Goldf.* Pet. Germ., vol. ii, t. 96, fig. 3, *a—b.*
— Lamalii. *Nyst.* Coq. Foss. de Belg., p. 305, pl. 22, fig. 5, *a—b,* and pl. 24, fig. 5, 1844.
— Pandoræ? *Desh.* Exped. Scient. de Morea, pl. 2, figs. 12—14, 1833.

Spec. Char. Testâ suborbiculari, æquivalvi? æquilaterali, convexiusculâ; radiatim costatâ, costis 18—20 *convexis inæqualibus, longitudinaliter tenuissimé lineatis, in juventâ nodosis vel subimbricatis; auriculis alteris minimis, radiantibus.*

Shell suborbicular, equivalve? equilateral, slightly convex; costated with 18 to 20 unequal rounded ribs, finely striated longitudinally; and nodose or imbricated in the young state; auricles unequal and rayed.

Diameter, ½ an inch.

Locality, Coralline Crag, Sutton. Recent, Mediterranean.

Five or six separated valves are all that I have obtained, and these appear to correspond with the recent species above referred to. Four localities are given by Payraudeau, of recent habitats, who says it is "peu abondant." The shell figured by Nyst is presumed to be the same, from the disposition of the rays; but he speaks of irregular and oblique striæ upon the sides of the shell, like those upon *tigrinus;* these I have not been able to detect in my specimens, which, however, may but ill display such sculpture, as they are, probably, only young individuals, not measuring more than half the diameter of the Belgian fossil; but from the representation, there is a slight difference, the auricles of his shell are rather more rounded, and more unequal, and approach nearer in that character to one of the varieties of *tigrinus.*

Our shell may be further described as having rounded rays generally single, sometimes arranged in pairs, but in no regularity in either the right or left valve, while the whole surface, as well on the costæ as between them, is covered with radiating striæ, these appear like linear markings in the shell, and not upon it, the line being alternately of a light and dark colour, that upon the centre of each rib, larger or broader than the rest.

In the young shell, the rays are ornamented with nodose protuberances, and the interstices have then also a raised portion of the shell, so that, in its young state, the surface is prettily cancellated. The auricles are unequal, the anterior one being the larger of the two, though not displaying so great a disparity as in *tigrinus;* they are sharp and rectangular, and not the least rounded, covered with prominent rays, which are strongly decussated by raised lines of growth: there is a small byssal sinus under the anterior auricle.

This is quite distinct from any of the varieties of *P. tigrinus*, the larger or more rounded form of the rays, as well as less inequality in the auricles, will distinguish it; and in all the varieties of that species, strongly marked divaricating striæ, or curved lines radiating from the umbo, may easily be observed, but I have been unable to detect such markings upon my specimens of this species, although individuals of *tigrinus*, much less in size, exhibit them distinctly; and it seems also to be specifically different from *P. Dumasii*, in which the rays are larger, fewer, and more prominent, and the auricles of our shell are comparatively larger than those in that species. In the recent state, this is, probably, a deep water species, as Payraudeau speaks of his specimens having been obtained by means of the dredge.

6. PECTEN DANICUS, *Chemnitz.* Tab. IV, fig. 2.

PECTEN DANICUS. *Chem.* Conch. Cab., t. xi, p. 265, pl. 207, fig. 2043, 1795.
— — *G. Sow.* Thesaur. Conch., vol. i, p. 61, pl. 12, figs. 16 & 187.
— — *Forb.* and *Hanl.* Hist. Brit. Moll., vol. ii, p. 288, pl. 52, figs. 1, 2, 7—10.
— GLABRIS. *Brown.* Ill. Brit. Conch., pl. 32, figs. 3, 4, 1827.
— DUMASII. *Payr.* Cat. Moll. de l'Ile de Corsi., p. 75 pl. 2, figs. 6, 7, 1826.
— — *Desh.* Append. Lyell's Princ., vol. iii, p. 15, 1833.
— — *Forbes.* Rept. Ægean Invert., p. 183, 1843.
— — *Jeffreys.* Ann. Nat. Hist., vol. xix, p. 313.
— ASPERSUS. *Desh.* 2d ed. Lam., t. vii, p. 136, 1836.
— — *Phil. En.* Moll. Sic. vol. i, p. 82. 1836; and vol. ii, p. 57, 1844.
— JAMESONI. *Smith.* Mem. Wern. Soc., vol. viii, p. 58, pl. 2, fig. 1, 1838.
— — *Brown.* Illust. Conch. Gr. Brit., 2d edit, p. 73, pl. 25, fig. 7.
— SEPTEMRADIATUS. *Loven.* Ind. Moll. Scand., p. 31, 1846.
— TRIRADIATUS. *Müll.* Zool. Dan., vol. ii, p. 25, pl. 60, figs. 1, 2, (fide *Loven* and *Desh.*)
OSTREA HYBRIDA. *Gmel.* Syst. Nat., p. 3318, 1788 (fide *Loven*).
— — *W. Wood.* Ind. Test., p. 48, pl. 10, fig. 10, 1825.
— TRIRADIATA. *Turt.* ed. Linn., vol. iv, p. 268, 1806.
— — *W. Wood.* Ind. Test., p. 50, pl. 10, fig. 39, 1825.
— SEPTEMRADIATA. *Id.* - - p. 268, 1806.
— INFLEXA. *Poli.* Test. Sicil., vol. i, p. 160, t. 28, figs. 4, 5.
— CLAVATA. *Id.* - - - p. 161, t. 28, fig. 17.
PECTEN PSEUD-AMUSIUM. *Desh.* Exped. Scient. de Morea, p. 231, pl. 2, figs. 9—11, 1833.
Ency. Meth., pl. 212, fig. 6.

Spec. Char. Testâ subrotundatâ, æquilaterali, radiis 5—6 *rotundatis inæqualibus, striatis; auriculis inæqualibus.*

Shell subcircular, equilateral, thin, with rounded or convex rays varying in number from 5 to 6 striated; auricles unequal.

Diameter, 1 inch.

Locality. Clyde Beds. Recent, Ægean, and Scandinavia.

Although this species, in the recent state, has been obtained in the Ægean, as well as in the Mediterranean Sea, and is quoted also by Philippi as an abundant fossil in the Sicilian Beds, I have not yet seen it from any of the three Crag Formations of Essex, Suffolk or Norfolk. As it is a fossil in the Clyde Beds, and may, probably, be hereafter found in the Crag, it ought not to be here passed over in silence. The specimen figured (which is the right valve) was given to me by James Smith, Esq., of Jordan Hill, and is undoubtedly identical with the British shell recently obtained in considerable plenty by Mr. George Barlee.

Our specimen contains a good deal of animal matter, with some slight remains of colour, as indicative of its comparatively modern origin. The shell like that of *P. tigerinus*, is ornamented with curved radiating or diverging striæ, but less prominent and distinct, and most visible at the lateral edges. A specimen of *P. Dumasii*, given to me by Professor Edward Forbes, which he obtained from a great depth in the Ægean Sea, does not appear to differ specifically from the British shell, and I have followed his example in uniting the two. Our fossil, however, appears to agree with the recent British specimens better than with the *Dumasii* from the Mediterranean, in having a rather larger posterior auricle; but my specimen from the Ægean differs also in that character from the Mediterranean shells, in having as large an auricle comparatively as the British specimens. The number of ribs is a variable character; sometimes the right valve has six, when the left one has only five, the depressions of the one valve corresponding to the elevations of the other, and *vice versâ*.

In this, as in most of the species of this genus, the auricles are comparatively larger in the younger shell than in the adult; my specimen, is a full grown shell, with six ribs or elevations, and the whole surface rayed or striated longitudinally, made rough or scabrous by elevated lines of growth, and the diverging or curved striæ visible only at the sides.*

7. PECTEN PRINCEPS, *J. Sowerby*, Tab. VI, fig. 1.

PECTEN PRINCEPS. *J. Sow.* Min. Conch., t. 542, fig. 2, 1826.
— — *Woodward.* Geol. of Norf., p. 44, 1833.
— — *S. Wood.* Catalogue, 1840.
— — *Morris.* Cat. of Brit. Foss., p. 115, 1843.
— CLINTONIUS? *Say.* Journ. Acad. Nat. Sci., vol. iv, p. 135, pl. ix, fig. 2, 1824.
— — ? *Conrad.* Foss. of the Med. Tert. of the United States, p. 47, pl. 23, fig. 1, 1838.
— SUBLÆVIGATUS? JUV. *Nyst.* Coq. Foss. de Belge, p. 298, pl. 24, fig. 4, 1844.

Spec. Char. Testâ, orbiculari, subinæquivalvi, convexâ, longitudinaliter costatâ, costis numerosis confertis, subsquamosis, interstitiis divaricatim striatis; auriculis magnis subæqualibus; valvâ dextrâ minori.

Shell orbicular, slightly inequivalve, convex, externally ornamented with numerous close set, rounded and slightly squamose or imbricated striæ, with a small intermediate ray in the aged shell, and fine diverging striæ visible between the rays; ears large, nearly equal, and rayed; right valve the smaller of the two.

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* A specimen much worn, and without its auricles, very recently found in the Red Crag, is in my Cabinet, and may possibly be of this species, but it is too much mutilated for fair examination.

Length, 5$\frac{3}{8}$. *Height*, 5$\frac{1}{4}$ inches.

Locality. Cor. Crag, Ramsholt.

This noble shell appears not to have lived beyond the Period of the Coralline Crag, at least, I have not seen it from any more recent deposit, although Woodward, in his 'Geol. of Norf.' has included it in his List of Fossils from the Mammaliferous Crag at Thorpe, with the letter *a* at the end of the locality, denoting its abundance, but I have not been able to see a specimen, or ascertain that it was even found in that formation, perhaps, fragments or imperfect specimens of *P. Islandicus* may have been mistaken for it.

This is the largest species of the genus belonging to the nearly equivalved section, equalling in magnitude the common Scallop. *Pecten Magellanicus* somewhat resembles this shell, and may be considered its representative on the other side of the Atlantic; but it has not the rays so distinctly marked or elevated as those upon the Crag shell, and is a flatter or more compressed species, with a few other minor distinctions sufficient to separate the two.

An American fossil above referred to, as far as can be determined by the figure and description, appears so closely to resemble our shell, that they are here considered as probably the same species; some slight differences may, however, be pointed out, as our reliance is entirely upon the representation, without the opportunity of comparison. Our shell has the auricles large and unequal, those on the posterior side being much the smaller, while in the American fossil they appear more equal, and somewhat less, and the rays are represented as bifurcating, or double in number, on the outer part of the shell, or its latter growth; the Crag shell has from 70 to 80 small and convex rays, rounded and slightly imbricated, but never angulated, the distance between them about equal to the rays; at the outer part of my largest specimen is an intermediate ray, thereby resembling the figure of the American fossil; between the rays may be seen fine diverging or divaricating striæ, crossing the lines of growth in an oblique direction. Under the anterior auricle of the right valve is a large opening. The valves are closed nearly all round, slightly gaping at the shoulders. The same sized rays ornament the auricles, which are also scabrous. Oysters and Barnacles are attached to the roughened surface of the shell, and may be seen, sometimes upon the right, in others on the left valve.

This was found, *in situ*, in the tranquil deposit at Ramsholt. *Pecten sublævigatus Nyst*, so much resembles a small specimen in my possession, that it is probably only the young state of this species.

Say's name appears to have priority of date, but from the uncertainty of identification, the much more appropriate one given by Mr. Sowerby has, for the present, been retained.

8. **Pecten pusio**, *Pennant.* Tab. VI, fig. 4, *a—c.*

Lister. Hist. Conch., lib. iii, par. 1, figs. 9, 18? and 23? 1789.
Palliolum? *Chem.* Conch. Cab., vii, p. 333, t. 67, figs. 635-6, 1784.
Ostrea miniata. *Born.* Mus. Cæs. Vind., p. 104, t. vii, fig. 1, 1780.
— multistriata. *Poli.* Test. Sicil., vol. ii, p. 164, t. 28, fig. 14, 1795.
— pusio. *Don.* Brit. Shells, vol. i, pl. 34, 1799.
— sinuosa. *W. Wood.* Ind. Test., p. 50, pl. 10, fig. 34, 1825.
Pecten pusio. *Penn.* Brit. Zool., vol. iv, pl. 61, fig. 65.
— — *Turt.* Brit. Biv., p. 215, pl. 17, fig. 2, 1822.
— — *Payr.* Cat. Moll. de l'Ile de Cors., p. 74, 1826.
— — *G. B. Sowerby.* Genera, No. 31, fig. 6.
— — *Phil.* En. Moll. Sic., vol. i, p. 84, and vol. ii, p. 58, 1844.
— — *Forb.* and *Hanl.* Hist. of Brit. Moll., vol. ii, p. 278, pl. 50, figs. 4, 5; pl. 51, fig. 7.
— distortus. *Da Costa.* Brit. Conch., p. 148, pl. 10, figs. 3, 6.
— — *Mont.* Test. Brit., p. 148, and Sup., p. 61, 1808.
— — *Lovén.* Ind. Moll. Scand., p. 30, 1846.
— sinuosus. *Turt.* Brit. Biv., p. 210, pl. 9, fig. 5, 1822.
— — *Brown.* Illust. Conch. Gr. Brit., pl. 32, fig. 2, 1827.
— — *Forbes.* Geol. Surv. of Gr. Brit., vol. i, p. 86, 1846.
— spinosus. *Brown.* Illust. Conch. Gr. Brit., pl. 33., fig. 8, 1827.
— striatus. *J. Sowerby.* Min. Conch., t. 394, figs. 2—4, 1823.
— — *Dujard.* Mem. Soc. Geol. de France, t. ii, pl. 2, p. 270, No. 3, 1837.
— — *Nyst.* Coq. Foss. de Belg., p. 301, pl. 15, fig. 1, *b*, *b'*, *d*, 1843.
— serratus. *Dubois.* Conch. Foss. de Wolhyn. Podol., p. 73, pl. 8, fig. 5, 1831.
— gloria maris? *Id.* - - - p. 72, pl. 8, figs. 6 & 19, 1831.
— squamulosus. *Desh.* Exped. Sci. de Morea, pl. 5, fig. 7—11, 1833.
— limatus. *Goldf.* Pet. Germ., vol. ii, p. 59, pl. 94, fig. 6, *a—b.*
— — *Chenu.* Conch. Illust. Pecten, pl. 49, fig. 5.
— elongatus? *Goldf.* *Loc. cit.*, pl. 94, fig. 7, *a—c.*
Hinnites pusio. *G. B. Sow., Jr.* Conch. Man., fig. 173.
— sinuosus. *Desh.* 2d ed. Lam., t. vii, p. 149, 1836.
— — *G. B. Sow., Jr.* Thesaur. Conch., vol. i, p. 79, pl. 20, figs. 1—3, 1847.
— irregularis. *Desh.* Ency. Meth. Vers., t. ii, p. 273, No. 1.

Spec. Char. *Testâ orbiculato-ovatâ, subæquivalvi, æquilaterali, radiatâ, radiis confertis, numerosis,* 2—3 *partitis, irregularibus, lævibus aut scabris; auriculis inæqualibus.*

Shell orbiculato-ovate, subequivalve, equilateral with numerous close-set rays, in sets of two or three, irregularly scabrous, with very unequal auricles.

Longitudinal diameter, 2 inches; *height,* 2$\frac{3}{8}$ths of an inch.

Locality. Cor. Crag, Sutton, Ramsholt, and Sudbourn.
Red Crag, Sutton, Bawdsey, Walton Naze.
Recent, Britain, Mediterranean, Bergen.

This shell is abundant in both formations, and in the Coralline Crag at Ramsholt the two valves are often united. In the young state, the Crag shell so much resembles the recent specimens of the same size, that it cannot be considered otherwise than identical, as suggested by Philippi, 'En Moll. Sic.,' vol. i, p. 84, notwithstanding a material change in its habits appears to have taken place in the modern shell, where, after it has attained a certain age or magnitude, it attaches itself to some stone or rock, by the entire surface of the right valve adhering by the scabrous or imbricated portions of the rays, in consequence of which it is often distorted, moulding itself to the inequalities of the body to which it is fixed, producing great variation in form, from which circumstance the recent shell has been separated into two or more species. This does not appear to have been the habit of the Crag shell, as amongst the numerous specimens I have seen, there is no indication of its having been attached by the exterior surface, but may have been a fixed species by means of a byssus, as in all the right valves a large opening exists beneath the anterior auricle, so far resembling the habits of the recent species in being fixed though by a different process.* Some of my specimens have attained a diameter of rather more than 2¼ inches from the umbo to the ventral margin, but, unlike the full-grown recent shell, have retained their regularity of form throughout their whole existence. There is often a slight obliquity in the shell, produced probably from its attached habits, the large byssus causing the auricle on that side to be more elevated than on the posterior, which is not only much smaller, but more depressed. The valves are nearly equal in convexity, though the right one is a little the flatter of the two, and in general the rays are arranged in pairs, unequal in size, the larger one being scabrous, sometimes less regular with three of different sizes, and all imbricated, the exterior is, however, very deceptive in this character, as in one variety which from the entire absence of these imbrications as well as from a greater regularity in the rays, it was assumed to be a distinct species, and passed in my catalogue under the name of *striaturus,* which there is reason now to believe is not entitled to that distinction. At the anterior opening beneath the auricles, are five or six elevated ridges for the purpose, probably, of keeping the byssus more spread, or in its place, and the shell appears to have had a somewhat large cartilaginous area, as well as a broad surface for the attachment of the ligament, the valves opening about five and twenty degrees. In the young as well as in the adult shell, there is a great inequality in the size of the auricles.

In this, as in many species of this genus, the exterior is ornamented with fine divaricating striæ, crossing the lines of growth at nearly right angles, visible also in the recent shell, and between the rays the surface is often subcancellated by the reflexed or thickened margin of the shell at the varied periods of increase.

The recent shell is stated, by the authors of British Mollusca, to range from near low water mark to 90 fathoms: most plentiful between 15 and 28. Its lateral range extends from the Mediterranean to the Norwegian shores.

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* Although never being itself fixed by the shell, its roughened exterior is well adapted for parasitical animals and we, consequently, find Oysters or Barnacles adhering to the valves.

9. Pecten opercularis, *Linnæus.* Tab. VI, fig. 2, *a—d*.

List. Hist. Conch., lib. iii, fig. 27.
Ostrea opercularis. *Linn.* Syst. Nat., p. 1147, No. 202, 1767.
— — *Born.* Mus. Cæs. Vindobon, p. 106, 1780.
— — *Schröt.* Einleit in die Conchyl., iii, p. 317, t. ix, fig. 3, 1784.
— — *W. Wood.* Ind. Test., pl. 10, fig. 43.
— subrufa. *Don.* Brit. Shells, vol. i, pl. 12, 1799.
— lineata. *Don.* Brit. Shells, vol. iv, pl. 116, 1803.
— sanguinea. *Poli.* Test. Sicil., vol. ii, pl. 28, figs. 7-8.
— — ? *Knorr.* Delices des Yeux., t. iv, fig. 1, 1766.
— plebeja. *Broc.* Conch. Foss. Subap., p. 577, t. 14, fig. 10, 1814.
Pecten pictus. *Da Costa.* Brit. Conch., p. 144, pl. 9, figs. 1, 2, 4, 5, 1778.
— lineatus. *Id.* - - p. 147, pl. 10, fig. 8.
— — *Mont.* Test. Brit., pp. 147, 579, 1803.
— — *Chenu.* Conch. Illust. Pecten., pl. 30, figs. 1, 2.
— opercularis. *Chem.* Conch. Cab., vii, p. 341, pl. 67, fig. 646, 1782.
— — *Mont.* Test. Brit., p. 145, 1803.
— — *Lam.* Hist. des An. Sans. Vert., vi, p. 172, 1822.
— — *Brown.* Illust. Conch. Gr. Brit., pl. 33, fig. 1, 1827.
— — *Payr.* Cat. des Moll. de la Corse., p. 77, 1826.
— — *Chenu.* Conch. Illust. Pecten., pl. 48, fig. 3.
— — *Goldf.* Pet. Germ., t. ii, p. 62, tav. 95, fig. 6, 1833.
— — *Phil.* En. Moll. Sic., p. 82, t. 6, fig. 2, 1836.
— — *G. B. Sow., Jr.* Thes. Conch., p. 53, pl. 17, figs. 141—146, 1847.
— — *Lovén.* En. Moll. Scand., p. 30, 1846.
— — *Forb.* and *Hanl.* Hist. Brit. Moll., vol. ii. p. 299, pl. L, fig. 3; L i, figs. 5, 6; L iii, fig. 7, 1849.
— sulcatus. *J. Sowerby.* Min. Conch., t. 393, fig. 1, 1823.
— — *Woodward.* Geol. of Norf., p. 44, 1833.
— — *Nyst.* Rech. Coq. Foss. Prov. d'Anv., p. 19, 1835.
— reconditus. *J. Sowerby,* Min. Conch., t. 575, figs. 5, 6, 1827.
— — *Nyst.* Rech. Coq. Foss. Prov. d'Anv., p. 19, No. 73, 1835.
— — *Potiez et Mich.* Cat. Moll. de Douai, p. 77, pl. 49, figs. 1, 2.
— subrufus. *Turt.* Brit. Biv., p. 210, t. 17, fig. 1, 1822.
— Audouinii. *Payr.* Cat. Moll. de Cors., p. 77, pl. 2, figs. 8, 9, 1826.
— plebeius. *J. Sowerby.* Syst. Ind., p. 244, 1835.
— — *Bronn.* Leth. Geog., ii, p. 916, t. 39, fig. 16, 1838.
— Sowerbyi. *Nyst.* Conch. Foss. de Belg., p. 293, pl. 22, fig. 3, *b'*, and pl. 22 *bis*.
— Malvinæ. *Dubois de Montp.* Conch. Foss. Wolhyn. Podol., p. 71, pl. 8, figs. 2, 3.
— flavus? *Id.* - - - - - p. 72, pl. 8, fig. 7.
— rectangulus? *Id.* - - - - - p. 72, pl. 8, figs. 10, 11.
— pulchellinus? *Id.* - - - - - p. 70, pl. 8, fig. 8.
— radians? *Nyst.* Coq. Foss. de Belg., p. 294, pl. 24, fig. 3, 1844.
— 20-sulcatus. *Müll.* (fide *Lovén.*)
Description de l'Egypt Hist. Nat., pl. 13, figs. 5, 1—4, and pl. 14, fig. 8, 1826.
Ency. Meth., pl. 212, fig. 2.
Dale. Hist. and Antiq. of Harwich, p. 291, t. xi, fig. 1, 1730.

Spec. Char. Testâ suborbiculari, subæquivalvi, longitudinaliter radiatâ radiis 18—26, *squamosis, squamis crebris, transversis, interradios divercatim striatis; auriculis subæqualibus; valvâ sinistrâ convexiori.*

Shell suborbicular, slightly inequivalved, covered with 18—26 imbricated or squamose rays, squamæ numerous and close set, between the rays are visible fine divaricating striæ; auricles nearly equal; the left valve, the more convex one.

Diameter, 2½ inches.

Locality. Cor. Crag, Passim.
Red Crag, Id.
Mam. Crag, Bramerton and Thorpe.
Recent, Britain, Finmark, and Mediterranean.

This is one of the most abundant shells, in the Coralline, as well as in the Red Crag Formations, and is exceedingly variable as regards the ornament and arrangement of its exterior, which has caused it to be separated into many different species, so greatly, indeed, does it vary in this character, that scarcely any description can be given of its sculpture, but what some deviation may be observed, so as almost to induce an opinion, that such difference might be considered as a specific distinction. The most abundant variety is that which corresponds with the rough and imbricated shell, now found living in the Mediterranean, figured and described as a new species by Payraudeau, under the name *P. Audouini*. This shell may be found in almost every locality, in the Coralline as well as in the Red Crag.

Both valves may be described as somewhat convex, though the upper or left valve is decidedly the more tumid of the two. Our shell is ornamented with more or less rounded rays, divided into threes, varying in number from 18 to 26, these are rather wider than the intermediate spaces, and are covered with rough imbricated squamæ, and the spaces between the ribs are generally imbricated in the same way. In the young shell the tripartite form of arrangement is seldom to be seen, the rays then being single, and this continues sometimes till the shell has increased to more than an inch in diameter; and the division of the intermediate space into three rays, does not, in some specimens, show itself until even a greater magnitude, by which the young shell differs so materially in its ornament, as to have been made into new species. In one variety of my Crag specimens, the rays are so strongly imbricated with reflexed squamæ, that in my Catalogue, it was considered a distinct species, and intended to have been described under the name *scabrotus* (fig. 2, *c*); but the possession of more specimens and further examination, give reason to believe it to be only a modification of the above species: in this, which, is somewhat of a young shell, the ribs are single, but the imbrications are continuous undulating over and between the ribs. The var. *lineolata*, I have seen only from the Red Crag, and that but rarely. *P. reconditus*, Min. Conch., is I conceive, to be only that form sometimes met with in which the rays have preserved their unity until the specimen has attained a magnitude of an inch and a half in diameter, although in some specimens, they separate into threes long before they attain that size, the separation of the rays generally producing a corresponding ornament upon the intermediate spaces, although that often depends upon the width of those spaces. This appears to differ from the London Clay shell and I doubt its being *Ost. recondita,* Brander.

In my specimens from Barton, are two varieties, one not having more than 18 or 20 rays, while the other has 30—32, these are more rounded than in the Crag shell; when perfect, in general they are more or less eroded, they are striated both upon and between the rays, but never distinctly keeled, the imbricated lines of growth are finer, and the auricles are comparatively larger. Nor could I detect upon them the fine divaricating striæ.

The auricles of our shell may be described as unequal, that of the left valve on the anterior side projecting, so as to form an angle less than 90°. In the right or flatter valve, the anterior auricle is longer or projects further than the posterior one, leaving in the full grown shell a considerable opening, even in those which have exceeded two inches and a half, and on the edge of the shell on that side are prominent denticles, four or five of which may be seen in the open space beneath the auricle.

The height of most specimens measuring from the umbo to the ventral margin, is rather less than the diameter of the opposite direction, although in some specimens these dimensions are reversed. The angle formed by the divergence of the rays from the umbo may be called a right angle, although it sometimes exceeds, while in the more elongated specimens, it falls short of that size. In some old shells, the anterior and posterior sides are extended, so as to give a high-shouldered appearance to the valve; and in all the younger specimens, the comparative size of the auricles is greater than in the larger shells, indeed, in the pullus state, they are equal to the entire length, and the shell then is nearly smooth.

Under a lens, fine divaricating striæ may be seen diverging or curving over the shell.

This species is stated by the authors of the 'Hist. Brit. Mollusca,' to possess a great vertical range, from five to one hundred fathoms, while its peculiar province in the British Seas is between fifteen and twenty-five.

10. **Pecten gracilis,** *J. Sowerby.* Tab. VI, fig. 5.

Pecten gracilis. *J. Sow.* Min. Conch., t. 393, fig. 2, 1825.
— — *S. Wood.* Catalogue, 1840.
— — *J. Morris.* Cat. Brit. Foss., p. 114, 1843.

Spec. Char. Testá gracili, suborbiculari, compressá vel planiusculá, tenui, costatá; costis acutis, angustis, inæqualibus, tripartitis, concentricè et tenuissimè imbricato-striatis; auriculis parvis inæqualibus.

Shell suborbicular, compressed or flattened, delicate, thin, and fragile, costated, ribs sharp and fine, unequal in size, arranged in threes; finely striated concentrically, with imbricated and slightly elevated lines of growth, ears small and unequal.

Diameter, 1½ inches.

Locality. Red Crag, Sutton, Holywells, and Bawdsey.

This, as yet, I have seen from the Red Crag only, and in that Formation it is by no means abundant.

Some varieties of *P. opercularis* seem to approach this so closely, that it is possible it may be only a modification of that variable species, with more attenuated and depressed valves than are commonly seen; there are, however, some differences which must, at least for the present, keep them separated, more especially as there is no necessity for the imposition of a new name. The variety linearis of that species, in the form and arrangement of its sculpture, appears to approach the nearest to our shell.

In *P. gracilis* both valves are much flattened, the right valve rather the more so of the two; the auricles appear comparatively less than in opercularis, and the rays are arranged much in the same manner, but rather more numerous, varying from twenty to twenty-six, generally tripartite or ranged in threes, the centre one the most elevated and the most sharp, with an intermediate one between the three, so that every fourth ray, as stated by Sowerby, 'Min. Conch.,' vol. iv, p. 129, is the most prominent and the most conspicuous; the same disposition of the rays may be observed in opercularis, var. *linearis,* only in that shell, neither the valves nor the rays are so much depressed. Our shell is ornamented with fine concentric striæ, or raised and subimbricated lines of growth, giving a roughness to the feeling, more than to the eye, but the same sculpture is present in *linearis.*

The most material differences are a greater flatness in the valves, a much thinner shell, with a slight alteration in proportionate or comparative dimensions, and smaller auricles; this last may, perhaps, be looked upon as the most distinguishing character, if they be really distinct, which more numerous specimens than I possess may perhaps determine.

A shell from the older Tertiaries at Bracklesham, somewhat resembles this in its graceful and elegant form, and slightly so in the disposition of the sculpture, but it has more numerous rays, and the imbricated lines of growth are finer.

11. PECTEN DUBIUS *Brocchi.* Tab. IV, fig. 3, and Tab. VI. fig. 3.

List. Hist. Conch., lib. iii, p. 1, fig. 29, 1687.
OSTREA DUBIA. *Broc.* Conch. Foss. Subap., p. 575, t. 16, fig. 16, 1814.
PECTEN SCABRELLUS. *Desh.* 2d ed. Lam., t. vii, p. 161.
— — *Bast.* Bord. Foss., p. 73, 1825.
— — *Goldf.* Pet. Germ., t. ii, p. 62, t. 95, fig. 5.
— — *Dujard.* Mem. Geol. de France, p. 270.
— — *Bronn.* Leth. Geog., ii, p. 917, t. 39, fig. 17, *a—c,* 1838.
— — *Grateloupe.* Cat. Zool. des An. Vert. et Invert. Bord., p. 58, 1838.
— — *Phil.* En. Moll. Sic., vol. ii, p. 60, 1844.
— MURICATUS? *Risso.* Princ. Prod. de l'Eur., t. iv, p. 304, 1826.
— VENTILABRUM? *Goldf.* Pet. Germ., t. ii, p. 67, t. 97, fig. 2.
— SOWERBYI. *Nyst.* Coq. Foss. de Belg., p. 293, pl. 22, fig. 3, *b,* and pl. 22 *bis,* fig. 3, *a',* 1844.
— TUMESCENS. *S. Wood.* Catalogue, 1840.

Spec. Char. Testâ suborbiculari, æquilaterali, subæquivalvi, radiatâ, radiis 14—18 *sulcatis, plurimum tripartitis, squamoso-denticulatis; auriculis inæqualibus.*

Shell suborbicular, equilateral, slightly inequivalved, with 14—18 large and elevated rays for the most part, one large, with a small one on each side, strongly imbricated ears, unequal, rayed, and squamose.

Diameter, 1½ inch.

Locality. Cor. Crag, Sutton, Ramsholt, Sudbourn, Gedgrave.
Red Crag, Sutton, Newbourn, Bawdsey, Walton Naze.

This is by no means rare in the Coralline, but rather more so in the Red Crag; it is, however, much less abundant than *opercularis*, though it may generally be obtained in those localities in which the shells of either Formation are met with in a good state of preservation.

The valves of this species may be described as equal in size, at least, as far as can be determined by the disconnected valves, which appear to present a similar amount of convexity, although a specimen of the left valve may occasionally be seen a little more tumid or deeper than the right. The rays are fewer than in *P. opercularis*, never exceeding eighteen, while they have sometimes not more than fourteen, but the general amount is the intermediate number; these are tripartite, and about an equal width with the spaces between them; the centre ray is much larger than the one on each side of it, and is covered with large and prominent squamæ or imbrications, while the smaller rays are also scabrous, but have more numerous and smaller squamæ, not corresponding with those upon the larger ray as if they were not formed at the same time by the reflexed edge of the mantle. The spaces between the rays in the young shell are naked or free from longitudinal striæ, which, however, become ornamented as the shell increases with from one to three rough and radiating scabrous lines. The length of the shell in most specimens is equal to the height, but when it deviates from this regularity it is in the direction from the anterior to the posterior side, which becomes greater than from the umbo to the ventral margin. Its most distinguishing characters appear to be the inequality of the auricles, the anterior one being much larger than the posterior, particularly in its young state, and much exceeds the differences observable in *P. opercularis*. The spread of the auricles at the ligamental edge equals 3-5ths the diameter of the shell, while in some small specimens the hinge area is comparatively larger. On the right valve beneath the anterior auricle, as in the last species, are some prominent denticulations, and the exterior of the shell is also ornamented with fine divaricating striæ, visible only with the aid of a magnifier.

One variety of what I have considered as the young of this species, is rather peculiarly ornamented on the left valve, having every third ray more especially covered with large and elevated imbrications, while the two intermediate ones are nearly smooth upon the outer edge (t. vi, fig. 3).

12. Pecten Islandicus, *Müller,* Tab. V, fig. 1.

Pecten Islandicus. *Müll.* Zool. Dan. Prod., p. 248, No. 2990, 1776.
— — *Chem.* Conch. Cab., vii, p. 314, pl. 65, figs. 615-16, 1782.
— — *Brown.* Illust. Conch. Gr. Brit., pl. 33, fig. 3, 1827.
— — *Flem.* Brit. An., p. 385, 1828.
— — *Desh.* 2d ed. Lam., vii, p. 145, 1836.
— — *Gould.* Invert. Massach., p. 133, fig. 87, 1841.
— — *Möller.* Ind. Moll. Grœn., p. 16, 1842.
— — *G. Sow.* Thesaur. Conch., vol. i, p. 75, pl. 17, figs. 159-160, 1843.
— — *Dekay.* Nat. Hist. New York Zool., p. 173, pl. 11, fig. 206, 1843.
— — *Lovén.* Ind. Moll. Scand., p. 30, 1846.
— — *Chenu.* Conch. Illust. Pecten., pl. 32, figs. 1—4.
— — *Forb.* and *Hanl.* Hist. Brit. Moll., vol. ii, p. 303, 1849.
— — *Middendorff.* Mem. de l'Acad. des Sci. St. Petersb., p. 526, t. 12, figs. 7-8, 1849.
— — *G. B. Sow., Jr.* Thesaur. Conch., vol. i, p. 75, pl. 17, figs. 159—161, 1847.
Ostrea Islandica. *Gmel.* Syst. Nat., p. 3326, 1788.
— — *Turt.* ed. Linn., vol. iv, p. 267.
— — *Shaw.* Zool. Misc., vol. xxiii, t. 978, 987.
— — *W. Wood.* Ind. Test., p. 49, pl. 10, fig. 21, 1825.
— cinnabarina. *Born.* Mus. Cœs. Vind., p. 103, 1780.
— — *Dillwyn.* Desc. Cat. Rec. Shells, p. 256, 1817.
Pecten Pealii. *Conrad.* Amer. Mar. Conch., p. 12, pl. 2, fig. 2, (fide *Gould*).
Ency. Method., pl. 212, fig. 1.
Lister. Hist. Conch., pl. 1057, fig. 4.

Spec. Char. Testâ suborbiculari, æquilaterali, convexiusculâ, subæquivalvi, radiatâ, radiis numerosissimis, bisulcatis, scabriusculis ; auriculis inæqualibus.

Shell suborbicular, equilateral, slightly convex, subequivalve, covered with numerous close-set, somewhat scabrous bisulcated rays or costulated striæ; auricles unequal.

Locality. Clyde Beds.

Recent, Scandinavia, Greenland, and North American Seas.

This handsome shell is rejected by British Conchologists, as a living inhabitant of our own Seas, it must necessarily, therefore, fall into the hands of the British Palæontographist, as a fossil species, it being abundant in the Clyde Beds. Dead valves have been dredged up in the Scottish and Zetland Seas, from depths varying from thirty to one hundred fathoms.

It is, essentially, a Boreal species, and is found living upon the Banks of Newfoundland, where it is said by Dr. Gould, to be the favorite food of fishes. I have not as yet seen a specimen from any of the three Formations into which the Crag has been separated, although fragments of what may belong to this species have been found in the Mammaliferous Crag, at Bramerton, and what were considered to have been *P. Princeps*, by Woodward, were, probably, only portions of specimens of this shell which sometimes attains a magnitude of four inches in diameter, a size that might well lead to such an error.

Our figure is taken from a magnificent specimen found in the beds of the Clyde, and now in the Museum of the Geological Society, presented by James Smith, Esq., of Jordan Hill.

13. Pecten varius, *Linnæus.*

Ostrea varia. *Linn.* Syst. Nat., ed. 12, p. 1146, No. 199, 1767.
— — *Poli.* Test. Sic., vol. ii, p. 163, t. 28, fig. 10, 1793.
— — *Don.* Brit. Shells, vol. i, pl. 1, fig. 1, 1799.
— — *Shaw.* Nat. Miscel., vol. 23, fig. 993.
— — *Mawe.* Linn. Conch., pl. 14, fig. 4, 1823.
— — *W. Wood.* Ind. Test., p. 50, pl. 10, fig. 31, 1825.
— — *Burrow.* Elem. Conch., p. 144, pl. 9, fig. 2, 1815.
Pecten varius. *Chem.* Conch. Cab., vii, p. 331, pl. 66, figs. 633, 634, 1782.
— — *Crouch.* Int. Lam. Conch., p. 12, fig. 4, 1827.
— — *Brown.* Illust. Conch. Gr. Brit., pl. 33, fig. 4, 1827.
— — *Phil.* En. Moll. Sic., vol. i, p. 84, 1836.
— — *J. Smith.* Mem. Wern. Soc., vol. viii, p. 46, 1838.
— — *G. B. Sow.* Conch. Man., fig. 171, 1843.
— — *Id.* Thesaur. Conch., vol. i, p. 76, pl. 19, fig. 214, 218, 1847.
— — *Thorpe.* Brit. Mar. Conch., p. 118, 1844.
— — *Phil.* En. Moll. Sic., vol. ii, p. 58, 1844.
— — *Lovén.* Ind. Moll. Scand., p. 30, 1846.
— — *Alder.* Cat. Moll. North. and Durh., p. 77, 1848.
— — *Forb.* and *Hanl.* Hist. Brit. Moll., vol. 2, p. 273, pl. 50, fig. 1, 1849.
— monotis. *Dacosta.* Brit. Conch., p. 151, pl. 10, figs. 1, 2, 4, 5, 7, 9, 1778.

Spec. Char. Testâ rotundato-ovatâ, æquivalvi, æquilaterali, radiatâ; radiis 26—30, *subcompressis, squamoso-scabris; auriculâ alterâ minimâ.*

Shell roundedly ovate, equivalve, equilateral, ornamented with 26—30 subcompressed rays, which are covered with squamose imbrications; ears unequal.

Locality. Clyde Beds. Recent, North Seas, Britain, and Mediterranean.

This is given by Philippi, as a living species in the Mediterranean, and enumerated by Lovén, as an inhabitant of the Coast of Scandinavia; but it has not yet, that I am aware of, been found in either of the three deposits of the Crag. As it is undoubtedly a fossil, in the Clyde Beds, and found frequently in the upper Tertiaries of Sicily, it may, probably, yet be discovered in the Red or Mammaliferous Crag in our own country. It would not, however, be here introduced simply upon such anticipation, but it is claimed as one of the fossils of our upper Tertiaries.

LIMA,* *Bruguere,* 1797.

PLAGIOSTOMUS. *Llwyd.* 1698.
RADULA. *Chem.* 1784.
GLAUCUS and GLAUCODERMA. *Poli,* 1795.
OSTREA (sp.). *Linn.*
MANTELLUM. *Bolten,* 1798.
PECTEN (sp.). *Mont.*
PLAGIOSTOMA. *J. Sow.* 1814.
GLAUCION. *Oken.* 1815.
LIMATULA. *S. Wood.* 1840.
LIMULA. *D'Orb.* sec. *Gray.*

Gen. Char. Shell ovate, equivalved, generally oblique, inequilateral, and gaping at both sides; sometimes closed and equilateral, externally costated or striated, radiating from the umbo; often rough and squamous like a file. Hinge area extended into auricles, bipartite; cartilage occupying the central or triangular portion; ligament more external and linear. Palleal impression entire, that by the adductor muscle large, ovate, and eccentric.

The animal of this genus has the lobes of the mantle disunited, the margins fringed with long tentacular filaments, and without siphonal tubes. A small compressed foot furnished with a byssal groove.

Some species approach very closely to those of the genus Pecten, in being equilateral, and enclosing the animal within the shells when they are brought together; in others, the shells gape widely, both on the anterior and posterior sides, and the animal is too large to be covered by the valves. A subgenus was proposed by myself, for those species which are equilateral and closed (under the name *Limatula*); but recent examinations of the animals of both sections are said not to present differences sufficient to justify generic separation. They are, therefore, here united.

The name of *Limea* was proposed as a genus for those species which are furnished with teeth or crenulations upon the hinge margin on each side of the cartilaginous pit, and the name *Limoarca* was also given in consequence to the same section, but this character alone, it is to be feared, is not sufficient for generic separation; specimens of *Lima subauriculata* in my own cabinet, are in like manner supplied with minute crenulations. Dr. Loven, however, states the animal of his *Limea Sarsii* to have the margin of its mantle destitute of tentacular appendages. Species, probably belonging to this genus, from the older Secondary Formations figured and described under the name of *Plagiostoma*, have been long known, and were abundant in some of the older periods. In those shells the gape or opening appears to have been on the rounded or posterior side, on which, in the recent shell, is placed the large adductor muscle, while the foot, the organ that secretes the byssus, is on the anterior side, which appears to have been capable of being quite closed, the opening, therefore, was not, probably, for the organ of attachment, and as in the recent species, their shells vary much in those characters, the secondary fossils were most likely of this genus.

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* Etym. *limus* crooked, oblique; *lima*? a file.

1. **Lima exilis**, *S. Wood.* Tab. VII, fig. 6, *a—c.*

Lima exilis. *S. Wood.* Mag. Nat. Hist., New Series, vol. iii, p. 233, Sup., pl. 3, fig. 1, 1839.
— — *S. Wood.* Catalogue, 1840.
— — *Morris.* Cat. of Brit. Foss., p. 111, 1843.

Spec. Char. Testá ovatá, valdè obliquá, depressá, fragili, exili, utroque latere hiante; costato-striatá, striis 25-35 *asperimis, undulatis; cardinis obliqui area angustá; auriculis minimis æqualibus.*

Shell ovate, very oblique, somewhat depressed, slender, and fragile, gaping largely on both sides; striated or costated, striæ 25-35, rough, irregular and unequal, cardinal area large, oblique ears, rather small and equal.

Longitudinal diameter, $1\frac{1}{4}$ inch. *Height,* $1\frac{1}{2}$ inch.

Locality. Cor. Crag, Ramsholt, Sudbourn.
Red Crag, Walton Naze.

This elegant shell does not appear to have been very scarce in the Coralline Crag Sea, having myself procured a dozen specimens, most of which were from one locality, Ramsholt; it is also occasionally found in the more tranquilly deposited portion of the Red Crag at Walton Naze, but its fragility in proportion to size is against its preservation in that deposit, as even in the older formation, specimens are not often obtained in a perfect state.

Messrs. Forbes and Hanley have introduced this fossil into their synonyma of *L. hians,* considering it only as a variety of that species, to which opinion I am not willing to assent as a marked and striking difference is presented by my fossils sufficient by the ordinary mode of valuation in specific distinction to justify a separation. It somewhat resembles *L. inflata,* but is flatter and undeserving of that name, and a shell in the British Museum called *L. scabrella,* approaches it in some respects, but that is also more inflated, and is probably a variety of the *inflata;* I have therefore retained it as distinct, being intermediate between the British and Mediterranean species, approaching rather nearer to the latter than to the former.

It may be more particularly described thus: the form is irregularly ovate, very oblique, gaping on both sides, and covered with raised and slightly undulating costulated striæ, these are rough or scabrous, at nearly regular distances, covering in some specimens the entire surface, but generally a small space is left naked on the anterior side; in *L. hians* the striæ are less regular, thicker on the posterior side, larger and more dissimilar on the anterior, in this they are rather more distant upon the posterior half; the comparative dimensions of this are very different, taking the height at $1\frac{1}{2}$ inch from the umbo to the ventral margin, the diameter in the opposite direction is equal to $1\frac{1}{4}$ inch, but in *hians* the height is at least one third greater than the length; the hinge line in this is more oblique, the ligamental area broader and more shallow, with a smaller gape on both sides. Two forms of the British shell have been figured by Professor Forbes in the 'Mag. Nat. Hist.,' one of which is less elongated than the other, and more nearly approaches our shell, but there is still apparently a sufficient difference to keep them separated.

2. Lima hians, *Gmelin.* Tab. VII, fig. 2, *a—c*.

Ostrea hians. *Gmel.* Syst. Nat., p. 3332.
— — *Turt.* ed. Linn., vol. iv, p. 273, 1806.
— — *W. Wood.* Ind. Test., p. 51, pl. 11, fig. 53, 1825.
Lima tenera. *Turt.* Zool. Journ., vol. ii, p. 362, t. 13, fig. 2 (not *tenera Chem.*).
— — *Brown.* Illust. Conch. Gr. Brit., pl. 31, figs. 8, 9, 1827.
— — *Forbes.* Malac. Monen., p. 41, 1838.
— — *Id.* Report on Ægean Invert., p. 182, 1843.
— — *Phil.* En. Moll. Sic., vol. ii, p. 56, pl. 16, fig. 3, 1844.
— inflata. *Forbes.* Malac. Monen., p. 41, 1838.
— Sarsii. *Kröyer,* fide *Lovén.*
— vitrina. *Brown.* Illust. Conch. Gr. Brit., pl. 31, figs. 10, 11.
— fragilis. *Flem.* Brit. Ann., p. 388, (partly,) 1828.
— — *Id.* Crouch. Corn. Faun., pt. 2, p. 37.
— aperta. *G. B. Sow.* Thes. Conch., vol. i, p. 87, pl. 22, figs. 26 & 27, 1847.
— — *Thorpe.* Brit. Mar. Conch., p. 249.
— hians. *Lovén.* Ind. Moll. Scand., p. 32, 1846.
— — *Forb.* and *Hanl.* Hist. of Brit. Moll., vol. ii, p. 268, pl. 52, figs. 3—5, and pl. R (animal), 1849.
— oblonga. *S. Wood.* Mag. Nat. Hist., New Series, vol. iii, p. 234, pl. 3, fig. 2, 1839.
Limæ. *Forbes.* Mag. Nat. Hist., vol. viii, pp. 593, 594, figs. 63 & 64, 1835.

Spec. Char. *Testâ oblongo-ovatâ, obliquâ, valdè inæquilaterâ, depressâ, gracili, costato-striatâ, striis vel radiis numerosis, asperimis, irregularibus, cardine obliquo, area triangulari latâ, auriculis æqualibus; margine denticulato.*

Shell elongato-ovate, oblique, very inequilateral, depressed, and slender; striated with numerous, rough, irregular, and slightly waved striæ, projecting beyond the ventral margin; gaping widely on the posterior side, slightly so on the anterior; ligamental area large and triangular, umbones prominent and distant.

Height, 1 inch. *Length,* 6-10ths of an inch.

Locality. Cor. Crag, Ramsholt.

Recent, Britain, Scandinavia, and Mediterranean.

This appears more scarce as a fossil than the preceding, having as yet obtained only two specimens, and those both of the same value, and from the same locality, there is, however, little doubt of its identity with the recent British species.

The form of this shell is comparatively much more elongated than the preceding, and is somewhat flatter; it gapes widely on both sides, that on the posterior is particularly deep immediately behind the hinge line, while the front gape is near the ventral margin; the exterior is covered with numerous irregular striæ or striated costæ, rough or scabrous, radiating in an undulating direction, extending from the extreme edge of the posterior side to the anterior, where, for a small space, it is naked or destitute of striæ, those on the posterior are fine and closer set, becoming larger and more distant as they approach the anterior, where they are rough and project beyond the margin. The hinge line is less oblique than in *exilis*, and is narrower, which perhaps it would be, if not a different species, corresponding thus with the more narrow form of the shell, but the ligamental area is deeper from the umbo inwardly, while the gape on both sides is larger than in that shell, and the whole contour in this is so different that, judging from the specimens which I possess, they cannot be united without an extension of variation greater than is generally permitted to species of this genus.

In the recent state, in the more northern parts of the British seas, it attains a greater magnitude than is given by the dimensions of our fossil, which may not, possibly, be a full-grown individual, although its gape is wide, a character of the adult shell; it is said one inch and three quarters is not an uncommon size in the recent British specimens, whilst those found at Guernsey are less, resembling in this peculiar our Crag fossil.

3. Lima Loscombii, *G. Sowerby*. Tab. VII, fig. 1, *a—c*.

Pecten fragilis. *Mont.* (not *Chemnitz*). Test. Brit. Sup., p. 62, 1808.
Ostrea fragilis. *Turt.* Conch. Dict., p. 131, 1816.
Lima bullata. *Turt.* (not Ostrea bullata, *Born.*). Brit. Biv., p. 217, t. 17, figs. 4, 5.
— — *Thorpe.* Brit. Mar. Conch., p. 114, 1844.
— — *Phil.* En. Moll. Sic., vol. ii, p. 56, t. 16, fig. 2, 1844.
— Loscombii. *G. Sow.* Genera of Shells, No. 17, Lima, fig. 4.
— — *Reeve.* Conch. Syst., pl. 112, fig. 4.
— — *G. Sow.* Thesaur. Conch., vol. i, p. 86, pl. 22, figs. 20—22.
— — *Lovén.* Ind. Moll. Scand., p. 32, 1846.
— — *Forb.* and *Hanl.* Hist. of Brit. Moll., vol. ii, p. 265, pl. 53, figs. 1—3.
— — *Alder.* Cat. Moll. North. and Durh., p. 78, 1848.
— fragilis. *Brown.* Illust. Conch. Gr. Brit., pl. 31, figs. 6-7, 1827.
— — *Forbes.* Mag. Nat. Hist., vol. viii, p. 594, fig. 65.
— — *Id.* Malac. Monen. p. 40, 1838.
— — *S. Wood.* Mag. Nat. Hist., New Series, vol. iii, p. 235, pl. 3, fig. 3, 1839.

Spec. Char. *Testá tumidá, oblique-ovatá, inæquilaterá, tenui, fragili; utroque latere perparvulum hiante, striatá, striis tenuissimis, alternatis, undulatis, cardine obliquo.*

Shell tumid, obliquely ovate, inequilateral, thin and fragile; very slightly gaping on either side, covered with fine striæ, slightly undulating, and alternately larger and smaller; cardinal area oblique and small.

Greatest Diameter, $\frac{3}{4}$ of an inch.

Locality. Cor. Crag, Sutton and Ramsholt.
Red Crag, Walton Naze.
Recent, Britain, Norway, and Mediterranean.

This elegant and fragile shell is by no means rare in the Coralline Crag at Sutton, but rather less so at Ramsholt. Walton Naze is the only locality in the Red Crag from which I have seen it. There cannot, it is presumed, be any doubt about the identity of this species, which does not seem to possess even a local variation.

The striæ which ornament this shell are sometimes regular in size, but more often possess an intermediate smaller one; there is a very slight opening between the valves, near the hinge line on the posterior side, and the valves do not quite close on the anterior side towards the ventral margin; hinge line rather short, with a large and broad ligamental pit projecting inwards; a subcircular impression by a large adductor muscle towards the convex or posterior side of the shell.

4. Lima plicatula, *S. Wood.* Tab. VII, fig. 4.

Lima plicatula. *S. Wood.* Mag. Nat. Hist., New Series, vol. iii, p. 235, pl. 3, fig. 4, 1839.

Spec. Char. Testá minutá, inæquilaterali, obliquè-ovata, compressiusculá; costato-striatá, striis 14—16 *convexis, scabriusculis; anticè rectá, posticè rotundatá; auriculis valdè inæqualibus; cardine obliquo; areá ligamenti minutá; in auriculis dentibus obtusis.*

Shell small, inequilateral, obliquely ovate, slightly compressed; costated or striated; striæ 14—16 rounded and somewhat scabrous; anterior side straight, posterior rounded; auricles very unequal; hinge line oblique; ligamental area small, with an obtuse tooth in the centre of the auricles.

Longest diameter, $\frac{1}{5}$th of an inch.

Locality. Cor. Crag, Sutton.

About a dozen specimens of this shell are in my cabinet, but none of them in very perfect condition; and I have not seen other specimens, since the publication of it in the 'Mag. Nat. Hist.,' to give further assistance in its elucidation. It appears, however, to present characters differing from any other species with which I am acquainted, and it must, for the present at least, be considered as distinct, and may be more particularly described thus.

The shell is very oblique; the anterior straight, sloping from the umbo with a scarcely perceptible auricle on that side; while the posterior is not only rounded, but has a comparatively large and projecting ear: it appears to have been able almost to close the valve, or at least to have had a very slight gape, as the edge of the shell nearly touches all round when laid upon a flat surface with its exterior uppermost; the rays are rounded, slightly scabrous, and numbering about 17 or 18, and these are somewhat broader than the spaces between them, which are prettily ornamented with elevated ridges, giving it a cancellated appearance. The hinge is rather peculiar, the central depression or pit being small and very oblique; and on each side in the middle of the auricles is a tooth-like projection with a corresponding depression in the opposite valve; a similar character may be observed in other species of this Genus, where interlocking prominences and depressions are formed by the animal as an additional security against any injurious lateral movement of the valves. It appears to differ from *L. plicata* of the Touraine Beds in not being so elongated, and in having a broader ligamental area; and from *L. obliqua*, of the Paris Basin, in somewhat similar characters.

5. Lima subauriculata, *Montague.* Tab. VII, fig. 3, *a—c*.

Pecten subauriculata. *Mont.* Test. Brit. Sup., p. 63, t. 29, fig. 2, 1808.
— — *Flem.* Edinb. Ency., pl. 205, fig. 12.
Ostrea subauriculata. *Turt.* Conch. Dict., p. 131, 1816.
— — *W. Wood.* Ind. Test. Suppl., pl. 2, Ostrea, fig. 5.
Lima — *Turt.* Brit. Biv., p. 218, 1822.
— — *Flem.* Brit. An., p. 388, 1828.
— — *Thorpe.* Brit. Mar. Conch., p. 114, 1844.
— — *G. Sow.* Thesaur. Conch., vol. i, p. 84, pl. 22, fig. 23.
— — *Phil.* En. Moll. Sic., vol. ii, p. 56, 1844.
— — *Lovén.* Ind. Moll. Scand., p. 32, 1846.
— — *Alder.* Cat. of Moll. North. and Durh., p. 78, 1848.
— — *Forb.* and *Hanl.* Hist. of Brit. Moll., vol. ii, p. 263, pl. 53, figs. 4, 5, 1849.
— sulcata. *Brown.* Illust. Conch. Gr. Brit., pl. 31, figs. 4, 5, 1827.
— — *Möller.* Ind. Moll. Grœndl., p. 16, 1842.
Ostrea nivea. *Broc.* Conch. Subap., p. 571, t. 14, fig. 14, 1814.
Lima — *Risso.* Europ. Merid., t. iv, p. 306, 1826.
— — *Desh.* in Lyell's Princ., 1st ed, vol. ii, App., p. 12, 1833.
— — *Nyst.* Rech. Coq. Prov. d'Anv., p. 17, 1835.
— — *Phil.* En. Moll. Sic., vol. i, p. 78, 1836.
— — *Nyst.* Coq. Foss. de Belg., p. 281, pl. 21, fig. 4, 1844.
— sulculus? *Lovén.* Ind. Moll. Scand., p. 32, 1846.
— elongata. *Forbes.* Ægean Invert., 1843, Rep. Brit. Assoc., p. 192.
Limatula subauriculata. *S. Wood.* Mag. Nat. Hist., New Series, vol. iii, p. 236, pl. 3, fig. 6, 1839.
— — *Morris.* Cat. of Brit. Foss., p. 111, 1843.

Spec. Char. *Testâ elongato-ovali, æquilaterali, fragili, convexâ, in medio striatâ vel costatâ, striis rugosis, sæpè obtusè angulatis, mediis binis verticalibus; cardine recto; auriculis æqualibus.*

Shell elongato-ovate, equilateral, convex, fragile, and closed all round; costated or striated in the centre, becoming obsolete at the sides; striæ or costæ rugose, sometimes angulated; hinge line straight; auricles equal.

Length, $\frac{1}{4}$; *height*, $\frac{1}{2}$ an inch.

Locality. Cor. Crag, Sutton and Ramsholt.

Recent, Britain, Norway, and the Ægean Sea.

Small specimens of this species are by no means rare in the Coralline Crag at Sutton; this place and Ramsholt are the only two localities from which it has as yet been obtained; and there is no doubt about its identity with the recent British species.

Our shell is not strictly ovate, but more of an oblong form, with the angles rounded off; the sides being somewhat straight, or of very gentle curvature, it is tumid and thin; the whole of the ribs being visible on the inside, they occupy the centre of the shell, and are distributed over about half the surface, two or three of the middle ones being the most distinct, and these are more conspicuously so on the inside; umbones prominent and divergent, leaving a wide ligamental area between them, thereby enabling the animal considerably to divaricate the valves; costæ obtusely angulated, rough, but not imbricated, showing distinct lines of growth; hinge-line straight; cartilage pit concave, projecting inwardly, forming an angle of 90°, and occupying nearly half the ligamental area. The shell extends on each side of the umbo into what are called auricles, the greater part of which space is occupied by the ligament; on the inside beneath these auricles the shell is thickened and strengthened by a prominent ridge, diverging from beneath the umbo towards the sides: in some specimens may be seen the impression of the large adductor muscle inclining towards the centre; my largest specimens do not exceed half an inch, measuring from the umbo to the ventral margin, and the transverse diameter about half that size.

A specimen from the Ægean Sea was given to me by Professor E. Forbes, with the name of *L. elongata*, which so much resembles some of the Crag specimens (fig. 3, *c*), that I have introduced the name among the synonyma. In the Ægean shell, which was obtained from the depth of 100 fathoms, the costated striæ are in number about 20, more distinct and distant on the centre or convex portion, and of course widest near the margin, not rounded but angulated; while in the generality of specimens of *subauriculata* they are rounded, but the same characters of sharpened costæ are visible in some of the Crag specimens, and there is not a distinction between the two sufficient, in my opinion, for specific separation; probably with a large number of individuals of the Ægean shell, as much difference might be detected as is exhibited in my Crag specimens.

Upon some of the smaller and most perfect specimens of this species from the Crag, may be observed a row of fine crenulations, occupying the entire edge of the hinge-line (fig. 3, *b*), being a miniature representation of what has been considered a good generic character; these are, however, so small as to be of little service for the ordinary purposes in which the teeth or prominent portions of the shell about the hinge are employed by the animal.

LIMA OVATA, *S. Wood.* Tab. VII, fig. 5.

LIMATULA OVATA. *S. Wood.* Mag. Nat. Hist., New Series, vol. iii, p. 235, pl. 3, fig. 5, 1839.

Spec. Char. Testâ minutâ, ovatâ, æquilaterâ, undiquè clausâ, inflatâ; in mediis costatis, utrinque obsoletis, costis angulatis circa septem; cardine recto, foveo ligamenti trigonâ, concavâ.

Shell small, ovate, equilateral, tumid, and closed, costated, central portion with 7-9 angulated ribs, becoming obsolete or disappearing on the sides; hinge margin straight, with a trigonal and concave pit for the cartilage.

Height, $\frac{3}{20}$. *Length*, $\frac{1}{10}$. *Depth of united Valves*, $\frac{1}{10}$ of an inch.

Locality. Cor. Crag, Sutton.

This pretty little shell is very abundant in the Coralline Crag, at the above locality.

It appears to be quite distinct from the preceding, and differs in several characters, and there is no species recent or fossil known to me to which it can be assigned.

It has about seven angularly formed costæ, which occupy the central portion of the dorsal area, beyond these are faint traces of striæ, and in well preserved specimens the shell is semi-transparent, rendering these ribs visible in the interior, and giving about half a dozen rough crenulations to the ventral margin of the shell.

The ligamental area is large, and the central pit diverges from the umbo under an angle of about 80°, muscular impression subcentral and ovate. It differs from any of the specimens of the preceding species of the same size, in being thicker and more regularly ovate, the ventral margin is more pointed, the sides are less straight, while the costæ are more prominent and distinct. I have not seen *L. sulculus*, Leach and Lovén, but the descriptions do not accord with our Crag shell, as it wants the "mediis binis verticalibus," mentioned by the latter author, but which character may be seen in specimens of *L. subauriculata*.

Pinna.* *Linnæus.*

Pinna. *Arist. Aldrov. List. Linn. Lam.*, *&c.*
Pennaria. *Browne*, 1756.
Chimæra et Chimæroderma. *Poli.*, 1795.
Perna. *Adans*, 1757.
Oxysma? *Rafinesque*, 1819.
Curvula. *Id.*
Atrina. *Gray*, 1840.

Generic Character. Shell equivalved, inequilateral, oblique, triangular or wedge-shaped, generally thin and fragile; umbones terminal, hinge rectilinear, without teeth; anterior margin sinuated and slightly gaping for the passage of a byssus; posterior truncated. Impression by the mantle entire; ligament internal.

Animal triangular, in conformity with the shape of the shell; its mantle open or disconnected on all sides, except the dorsal edge, while its lobes line the whole interior of the valves; the lobes are ornamented with a double row of tentacular cirrhi or fringes round their posterior part; and a single row upon the anterior; foot somewhat small and slender, furnished with a byssal groove; no projecting siphonal tubes.

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* Etym. πίννα, *Arist.*, a kind of Pearl Oyster.

Animals composing this genus have their valves particularly thin, considering their dimensions, which sometimes attain considerable magnitude. In the recent state they are generally of a brownish or horny colour, which with their angular form have obtained for them, in France, the vulgar name of jambonneaux, or little hams. The shell gapes slightly at the anterior part near the beaks, through which is protruded a set of fibrous threads or byssus, so long as to have been occasionally manufactured into gloves and stockings. They are exclusively marine, having a range in depth somewhat considerable, living often in sand or mud, with their beaks or pointed extremity buried deep in the ground; sometimes fixed to submarine bodies, by means of the byssus, which it is said to be capable of displacing at will by the aid of its foot. The two valves are closely united or soldered, as it were, together, along the dorsal edge, and are incapable of much expansion, but they gape widely at their larger or posterior extremity, opposite the beak.

The number of recent species is somewhat limited, although they have a very wide geographical distribution, being found in most parts of the world, and the fossil species date as far back in time as the Oolitic Period, from which Formation there is one strongly resembling an existing form.

1. PINNA PECTINATA (?) *Linnæus.* Tab. VIII, fig. 11.

PINNA PECTINATA. *Linn.* Syst. Nat., ed. 12, No. 264, p. 1160, 1767.
— — *Turt.* Brit. Biv., p. 223, pl. 19, fig. 1, 1822.
— — *Forb.* and *Hanl.* Hist. Brit. Moll., vol. ii, p. 255, pl. 43, figs. 1, 2, and pl. 53, fig. 8, 1849.
— INGENS. *Mont.* Test. Brit., pp. 180, 583, and Sup., p. 72.
— — *S. Wood.* Catalogue, 1840.

A few fragments or imperfect specimens of a species of this genus have been obtained by myself from several localities in the Coralline Crag, but they are not in sufficiently good condition for instituting a fair comparison; what there is of them seem to present recognisable characters, and to correspond with those of the above-named recent species, and may, at least for the present, be considered as identical. In my Catalogue it was placed under the name of *P. ingens*, Mont., which the authors of the 'Hist. of Brit. Moll.' have determined to be only a variety of *pectinata;* the spiny or scaly sculpture of that shell being generally removed by abrasion as it advances in age.

In the small portion of what remains of our fossil, the radiating lines cover about half the shell, or from the dorsal edge extending into the middle of the valve; the ventral portion being sinuated and much thickened at the edge where the presumed byssus protruded, and the exterior is on that side ornamented with subconcentric or wavy undulations, like those visible upon the recent shell. This species, in the recent state, is one of our largest bivalves, and Montague says they are not uncommonly a foot in length. The specimen to which our fragment belonged, probably did not exceed half that size. The same authority states, p. 181, "We discovered a bed of these shells in Salcomb Bay, in Devonshire, where they are called by the fishermen French muscles or scallops. They lie on a gravelly bottom, covered with mud and long sea-weeds, and are only to be got at particular times when the sea recedes further than usual." This shell in its living state is of a sort of double composition, the thin and broadest, or outer portion, being of a brown and somewhat horny texture, while the thickened lining, or anterior portion, is of a nacreous substance, composed of fibrous filaments, causing the shell in the fossil state to separate readily at that part in a transverse direction; and pieces of this 'fibrous shell' are often met with in the Coralline Crag at Sutton, separating like finely attenuated glassy filaments.

AVICULA,[*] *Klein*, 1753.

PTERIA. *Scopoli*, 1777, sec. *Gray*.
RIPARIÆ (sp.). *Gevers*, 1787. *Id.*
MARGARITIFERA (sp.). *Humph.*, 1797.
ANONICA. *Oken.*, 1815.
PERLAMATER (sp.). *Schum.*, 1817.

Generic Character. Shell inequilateral, inequivalve, oblique; upper or left valve the larger or more tumid; the lower or right valve with an opening for the passage of a byssus; surface sometimes smooth, at others ornamented with squamose appendages, or furnished with radiating costæ; hinge-line rectilinear, often with the posterior extremity prolonged into the form of an extended wing; one obtuse tooth in each valve; paleal impression without a sinus; ligament external.

Animal triangular; the edges of the mantle disunited, and the margins fringed with small tentacles; foot small, subcylindrical, beneath which is a byssal groove; no syphonal tubes.

1. AVICULA TARENTINA ? *Lamarck.*

MYTILUS HIRUNDO. *Linn.* Syst. Nat., ed. 12, p. 1159 (in part).
— — ? *Poli.* Test. Utr. Sic., vol. ii, p. 221, t. 32, fig. 17, 1795.
AVICULA HIRUNDO. *Turt.* Brit. Biv., p. 220, pl. 16, figs. 3, 4, 1822.
— ACULEATA. *Risso.* Hist. Nat. des Princ. Prod. de l'Eur., t. iv, p. 308, 1826.
— ATLANTICA. *Brown.* Illust. Conch. Gr. Brit., pl. 10*, fig. 6, 1827.
— ANGLICA. "*Leach.*" *Id.* - - pl. 31, fig. 3.
— TARENTINA. *Lam.* Hist. des An. S. Ver., t. vi, p. 148, 1818.
— — *Forb.* and *Hanl.* Hist. Brit. Moll., vol. ii, p. 251, pl. 42, figs. 1—3, and pl. S., fig. 4, 1849.

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[*] Etym. *Avicula*, from its resemblance to a Bird's wing.

Two fragments were found by myself in the Coralline Crag at Gedgrave, which belong undoubtedly to this genus, and as far as can be determined from their mutilated condition, appear to be of the above-named species; they are introduced here provisionally until better specimens be procured than what I possess: my specimens of the left valve have an obtuse tooth immediately under the beak within the ligamental margin, and are beautifully nacreous within. The area for the ligament appears somewhat larger than is shown by the recent shell.

MYTILUS,* *Linnæus,* 1758.

MYTULUS. *Rondelet,* 1555, sec. *Herrm.*
MUSCULUS. *List.* 1687.
MITULUS. *Browne,* 1756.
PERNA (sp.). *Adans,* 1757.
Id. *Schum.,* 1817.
CALLITRICHE et CALLITRICODERMA. *Poli.,* 1795.

Generic Character. Shell equivalve, inequilateral, oblique, elongate, wedge-shaped or subtriangular, more or less tumid, sometimes thin and semitransparent, occasionally thick and opaque: in the recent state covered with an epidermis: umbones acute, terminal; hinge slightly denticulated; surface generally smooth, sometimes striated. Ligament linear, internal. Muscular impressions two, unequal, anterior one near the umbo, elongate, posterior one suborbicular near the posterior part of the ventral margin; palleal impression without a sinus and rather obscure.

Animal elongate, with the lobes of the mantle partly fringed, disconnected except at the posterior, where there is a short anal siphon: adductor muscles very unequal; a cylindrically formed foot furnished with a gland and groove.

Animals belonging to this genus are inhabitants of salt-water or estuaries, and are generally very littoral in their habits; the common Mussel, as is well known, is more often found where it is deserted by the retiring tide, but some are inhabitants of the sea at a considerable depth. The living species are found in various parts of the world, and in the fossil state have been obtained as low in the secondary series as the Cornbrash.

MYTILUS EDULIS, *Linnæus.* Tab. VIII, fig. 9, *a—e.*

MUSCULUS SUBCÆRULEUS. *List.* Hist. Conch., lib. iii, fig. A, 200, 1687.
MYTILUS EDULIS. *Linn.* Syst. Nat., ed. 12, p. 1157, No. 253, 1767.
— — VULGATISSIMUS. *Chem.* Conch. Cab. viii, p. 169, t. 84, figs. 750, 751, 755.
— PELLUCIDUS. *Penn.* Brit. Zool., ed. 4, vol. iv, p. 112, pl. 63, fig. 75.
— VULGARIS. *Da Costa.* Brit. Conch., p. 216, pl. 15, fig. 5, (left-hand fig.)
— INCURVATUS. *Penn.* Brit. Zool., pl. 64, fig. 74.
— ELEGANS. *Brown.* Illust. Conch. Gr. Brit., pl. 29, figs. 14, 15, 1827.

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* Etym. *μυτίλος* (deriv. a *μῦς*, as *ναυτιλος* a *ναῦς*).

MYTILUS FLAVUS. *Poli.* Test. Sic., vol. ii, p. 207, pl. 32, fig. 4, 1795.
— SAGITTATUS. *Id.* - - - 208, - figs. 2, 3.
— UNGULATUS. *Id.* - - - 209, - fig. 5.
— GALLOPROVINCIALIS. *Desh.* 2d ed. Lam., t. vii, p. 46.
— ABBREVIATUS. *Id.* - - - p. 47, No. 30.
— RETUSUS. *Id.* - - - p. 48, - 31.
— BOREALIS. *Dekay.* Nat. Hist. New York Zool., p. 182, pl. 13, fig. 222.
— DILATATUS. *W. Wood.* Ind. Test. Sup., pl. 2, MYTIL., fig. 2.
— SUBSAXATILIS. *Williamson.* Mag. Nat. Hist., 1834, vol. vii, p. 354, fig. 48, *a—d*
— ANGULATUS. *Alder.* MSS., fide *Williamson.*
— SOLITARIUS. *Rev. W. Mark.* MSS. *Id.*
— NOTATUS. *Dekay.* Nat. Hist. New York Zool., p. 182, pl. 13, fig. 223, 1843.
— ANTIQUORUM. *J. Sow.* Min. Conch., t. 275, figs. 1-3, 1821.
— — *Desh.* 2d ed. Lam., vii, p. 54, 1836.
— *Nyst.* Rect. Coq. Foss. Prov. d'Anv., p. 17, No. 66, 1835.
— — *Phil.* En. Moll. Sic., vol. i, p. 73, and vol. ii, p. 53.
— — *Nyst.* Coq. Foss. de Belg., p. 267, pl. 21, fig. 1, *a—b.*
— — *Basterot.* Mem. Geol. des Env. de Bord., p. 78, 1825.
— — *Woodward.* Geol. of Norf., p. 44, t. 2, fig. 20, 1833.
— ALÆFORMIS. *J. Sow.* Min. Conch., t. 275, fig. 4, 1821.
— — *Woodward.* Geol. of Norf., p. 44, 1833.
— AFFINIS. *Bean.* MSS. (not *Sowerby*).
— PLEBEIUS? *Dubois de Montp.* Conch. Foss. de Wolhyn. Podol., p. 69, pl. 7, figs. 26-28, 1831.
— EDULIS. *Brocchi.* Conch. Foss. sub. Apen., p. 584, 1814.
— — *Bast.* Mem. Geol. des Env. de Bord., p. 79, 1825.

Spec. Char. *Testâ elongato-trigonulâ, lævigatâ; anterius curvâ, subangulatâ; posterius retusâ; versus basim tumidâ; dentibus tribus vel quaternis.*

Shell elongate, of a subtrigonal form, smooth, anterior part curved, subangulated, posterior obtuse, tumid towards the base, hinge with three or four denticles.

Greatest diameter, 4 inches.

Locality. Red Crag, Sutton, Bawdsey, Ipswich.
Mam. Crag, Bramerton, Bridlington.
Recent, Mediterranean, Britain, Scandinavia, and North America.

The true edible species is first seen in the Red Crag Deposit, and is found in some places, as might be expected, in great abundance, but the specimens have become so thin and fragile, as to be with difficulty procured entire.

What is considered as the normal form of this species, by Messrs. Forbes and Hanley, is that variety which has been erected into a distinct species by Mr. Williamson, under the name *subsaxatilis.* In this the shell is more angular, and the posterior portion becomes broader, its solitary habits giving free scope to an expansion at that part, and enabling it to assume what may be called its natural shape. This variety has not been met with by myself in the Red Crag, but it is by no means uncommon in the deposit at Chillesford which rests upon it, and which probably belongs to the mammaliferous or more recent period, and where it is the only form of this species, the other varieties have all been obtained from the older formation.

The ligament of this is placed within the margin of the shell, although slightly visible externally, when the valves are closed, it extends the entire length of the dorsal edge, and a considerable scope is given to the dilatation of the valves; four small teeth are placed on the anterior side of the umbo interlocking each other; these teeth are always visible, though somewhat variable in their character, the anterior one being sometimes the larger, and *vice versâ*. In the increase of the valves a slight curvature is given to the umbo by the retrocession or retreating of the ligament: while fresh layers are deposited on the anterior margin, three small ridges are left upon the exterior, indicating the form and position of these teeth, which are produced internally by the indentures of the exterior. A small but deeply-seated muscle mark is visible on the anterior side, or immediately beneath the umbo, and a large subcircular one a little within the posterior part of the ventral margin. Mr. Alder says, "no species undergoes a greater degree of variation from locality than the common Mussel. For its full development, a mixture of fresh with salt water appears to be necessary, it is therefore met with in the greatest perfection at the mouths of rivers. In such localities the typical form of the species is to be found, and when left undisturbed usually forms large beds. On the more rocky and exposed parts of the coast it assumes a stunted appearance, running into the varieties of form mentioned above, always small on the exposed surface of rocks, but attaining a larger size in hollows and crevices."

In the Estuary Deposit of the Eocene Period, at Colwell Bay, as well as upon the opposite side of the Solent at Hordwell, is found a species of Mussel (*M. affinis*, 'Min. Conch.,' T. 532, fig. 1), which very much resembles the var. *pellucidus* of this species, but it is decidedly more carinated, and wants the denticles so conspicuous in the common edible Mussel, near the umbo; and notwithstanding the extraordinary range in variation assumed by this species, there is, I think, no doubt of the two shells being specifically distinct; a specimen from Bridlington, with this name, was obligingly sent to me for description by Mr. Bean, but there is every reason to believe it is only a variable form of our common Protean shell.

It is, in general, of littoral habits, being often found in the living state where left dry by the retiring tide, and as such, indicative of shallow water, although it is occasionally met with at considerable depth. Its geographical range is very great, being undoubtedly an inhabitant of the Mediterranean, as well as of the coast of the United States of America, and in both of which extremes of longitude it appears to be subject to the same variable character. This is a long known species, descriptions or figures of the recent shell having been given by almost every author, ancient or modern, who has ventured to describe a shell; and in order to show its range in variation, a list of names is introduced, under which it has been described, presuming all to belong to one and the same species, a single example of each name being considered sufficient for the living shell.

2. **Mytilus hesperianus**, *Lamarck.* Tab. VIII, fig. 10.

Mytilus hesperianus. *Lam.* Hist. des An. Sans. Vert., t. vi, p. 127, 1819.
— — *Desh.* 2d ed. Lam., t. vii, p. 48, 1836.
— — *Payr.* Cat. Moll. Cors., p. 68, pl. 2, fig. 5, 1826.
— densatus. *S. Wood.* Catalogue, 1840.

Spec. Char. Testâ elongatâ, obliquâ, incurvatâ densatâ, crassâ; margine dorsali arcuatâ.

Shell elongate, oblique, incurved, thick and heavy; dorsal margin convex.

Greatest Diameter, 2½ inches.

Locality. Cor. Crag, Sudbourn. Recent, Mediterranean, and Coast of Spain.

Two specimens only of this shell have yet come into my possession, and these are both of the right valve, and as they are all that I have seen, it does not appear to have been abundant during the Cor. Crag period. Fragments of a very thick Mussel, indicating a considerable curvature, and which I presume to belong to this species, are not unfrequently met with in various parts of the Red Crag; and as they have undergone a considerable deal of bouldering, may possibly have been washed out of the deposit of the antecedent period. I have given it therefore as a certain inhabitant of the older formation only.

It appears to present characters different from any of the varieties of the common edible Mussel, sufficiently it is presumed to entitle it to be considered a distinct species. The variety called *Myt. incurvatus,* Mont., approaches nearest in form, but the dorsal margin is never so convex as in our shell, and the specimens I have seen are much thinner. The Crag shell is very thick, more especially in the narrow part near the beaks, and the anterior side curves inwardly, while the dorsal and posterior portions are particularly convex in outline; the umbones are eroded, and the outer part of the shell near the beaks is so thin as to show the white lining through it, while towards the ventral portion the shell is of a deeper colour, as described by Payraudeau. My specimens are destitute of hinge-teeth, but their probable habitat in deep and more tranquil water may have rendered such unnecessary, and they may have thus become obsolete.

MODIOLA,* *Lamarck,* 1801.

Volsella. *Scopoli,* 1777, sec. *Gray.*
Callitriche et Callitrichoderma. *Poli.,* 1795.
Amygdalum. *Megerle,* 1811.
Crenella. *Brown,* 1827.
Brachydontes. *Swains.,* 1840.
Lanistes. *Id.* 1840.
Modiolarca. *Gray,* 1840.
Modiolaria. *Beck,* sec. *Loven,* 1846.
Lanistina. *Gray,* 1847.
Modiolopsis? *Hall,* 1847.

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* Etym. *Modiolus.*

Generic Character. Shell equivalve, inequilateral, irregularly and roundedly trapezoidal; valves sometimes smooth or slightly sulcated concentrically; sometimes entirely covered with radiating striæ, sometimes the central portions smooth with the lateral extremities striated; anterior side very short; umbo subterminal; hinge margin linear, generally smooth, occasionally crenulated or denticulated; ligament internal; impressions of the adductor muscles different in form and unequal in size; anterior one small and elongato-ovate; posterior one large and subcircular; impression of the mantle entire; shell slightly gaping for the passage of a byssus.

Animal of the form of the shell, and the margins of the mantle without a fringe: an elongated and cylindrical foot, with a gland at its base for the formation of a byssus.

This genus has by some conchologists been united with the preceding one, in conquence of some similarities between the animals as well as the shells. In this the animal differs in having a simple margin to its mantle, as well as a marked peculiarity in the branchial region, these characters are as distinct as are generally employed for the separation of genera, and in the shells the anterior side is always more or less pushed beyond the umbo, so as to give it a less triangular or a more trapezoidal form than in Mytilus. The aberrant species will, it is true, bear a close generic resemblance, and the line of demarcation is difficult to define, but the same may be said of most proximate genera. Some modern conchologists have constituted a new genus for those species which are externally ornamented or striated, a character here considered insufficient for generic distinction, more especially as in well-determined species of the preceding genus the shell is sometimes smooth, while in others it is covered with deep and strongly marked lines of radiating striæ.

It is doubtful also whether a line of crenulations upon the dorsal edge of the shell is a character sufficient alone for generic distinction. The genera *Crenella* and *Modiolarca* have therefore been included in the synonyma. Animals of this genus generally spin a byssus, by which they are attached, and the shell gapes a little at the anterior part of the ventral margin for its passage; several species in the recent state supply this material so largely, as to wholly invest the shell in a kind of nest; while others closely resembling this genus are capable of forming a habitation in the interior of calcareous rocks. (*Mytilus lithophagus*, Linn.)

This is truly a Marine genus, and found at various depths, and is known among the oldest of the Secondary Rocks; but it is rather sparingly distributed throughout the Tertiaries.

1. **Modiola modiolus**, *Linnæus*. Tab. VIII, fig. 1, *a—d*.

Mytilus modiolus. *Linn.* Syst. Nat., ed. 12, No. 256, p. 1158, 1767.
— — *Da Costa.* Brit. Conch., p. 219, t. 15, fig. 5, 1778, (right-hand fig.)
— — *Chem.* Conch. Cab., vol. viii, p. 178.
— — *Donov.* Brit. Shells, vol. i, pl. 23, 1799.
— — *W. Wood.* Ind. Test., p. 53, pl. 12, fig. 31, 1825.
— — *Müll.* Zool. Danica, pl. 53.
— — *Flem.* Edin. Ency., vol. vii, pl. 203, fig. 22.
— curtus. *Penn.* Brit. Zool., p. 112, pl. 64, fig. 76, *a.*
— curvirostratus. *Da Costa.* Brit. Conch., p. 220, 1778.
— umbilicatus. *Penn.* Brit. Zool., ed. iv, vol. iv, p. 112, pl. 65, fig. 76.
— — *Mont.* Test. Brit., p. 164, 1803.
— — *W. Wood.* Ind. Test., pl. 12, fig. 49, 1829.
— barbatus. *Don.* Brit. Shells, vol. ii, pl. 70, 1800.
— papuanus. *Nyst.* Coq. Foss. de Belg., p. 271, 1844.
Modiola papuana? *Desh.* 2d ed. Lam., t. vii, p. 18.
— — *Brown.* Brit. Conch. Illust., pl. 29, figs. 1—4, 1827.
— — *Say.* Amer. Conch., pl. 45.
— — *Leach.* Zool. Miscel., vol. ii, p. 33.
— modiolus. *Turt.* Brit. Biv., p. 199, pl. 15, fig. 3, 1822.
— — *S. Wood.* Catalogue, 1840.
— — *Dekay.* Nat. Hist. New York Zool., p. 185, pl. 24, fig. 257, 1843.
— — *Forb.* and *Hanl.* Hist. Brit. Moll., vol. ii, p. 182, pl. 44, figs. 1, 2, 1849.
— — *Midd.* Malac. Ross., loc. cit., p. 537, 1849.
— vulgaris. *Flem.* Brit. An., p. 412, 1828.
— — *Lovén.* Ind. Moll. Scand., p. 33, 1846.
— — *Alder.* Cat. Moll. North. and Durh., p. 81, 1847.
— grandis. *Phil.* En. Moll. Sic., vol. ii, p. 51, t. 15, fig. 13, 1844.
Ency. Meth., p. 219, fig. 1.

Spec. Char. *Testâ oblongo-ovatâ, gibbâ, lævigatâ; margine dorsali antico brevissimo; postico producto, subrecto; margine ventrali subsinuato; extremitate utraque rotundato.*

Shell oblong-ovate, tumid, and smooth; anterior dorsal margin very short; posterior much produced, with hinge-line nearly straight; ventral margin subsinuated, and both extremities rounded.

Locality. Cor. Crag?
Red Crag, Sutton.
Mam. Crag, Postwick, Bridlington.
Recent, Britain, N. Seas, Boreal, America, Mediterranean?

A few specimens only of this fine shell have been found by myself in the Red Crag, where it does not appear to have been abundant, although occasionally fragments have been met with at distant localities, testifying its somewhat general distribution in that deposit; a few fragments also of a *Modiola* of a similar form are in my cabinet from the Coralline Crag at Ramsholt, but the hinge-line being imperfect, I am unable to determine its specific character, and it was introduced into my Catalogue as belonging with doubt to this species.

In the recent state this shell is thick and strong, but my specimens differ materially in that character, and are particularly fragile. This species exhibits a very considerable degree of variation in its outward form or proportional dimensions, as may be observed in the specimens figured, but a similar variability is shown in the living shell: the two forms may be considered as belonging to one species, and there can be little doubt of its identity with the shell now common in our own seas. My specimens were all found at one locality in association with a bed of *Myt. edulis.* British Conchologists give it vertical range from low water mark to sixty fathoms.

I have introduced as a synonym *M. grandis Phil.*, believing it not to differ specifically from the British shell: some fossil specimens from Sicily (for which I am much indebted to Madame Power) in my cabinet, presumed to be the same as Philippi's species, have no character whereby they can be justly separated from the shell found upon the coast of Massachusetts. The size of the Mediterranean fossil is not sufficient for specific distinction, as a specimen of *modiolus,* measuring seven inches, is recorded by Captain Brown to have been obtained by a fisherman near the Bell Rock, on the coast of Forfarshire.

2. Modiola Barbata, *Linnæus.* Tab. VIII, fig. 2.

Mytilus barbatus. *Linn.* Syst. Nat., ed. 12, p. 1156, sec. *Forb.* and *Hanl.*
— — *Poli.* Test. Sicil., vol. ii, p. 210, pl. 32, figs. 6, 7, 1795.
Modiola barbata. *Lam.* Hist. des An. Sans. Vert., t. vi, p. 114, 1818.
— — *Phil.* En. Moll. Sic., vol. i, p. 70, and vol. ii, p. 50.
— — *Forbes.* Report. Ægean Invert., p. 180, 1843.
— — *Forb.* and *Hanl.* Hist. of Brit. Moll., vol. ii, p. 190, pl. 44, fig. 4.
— Gibbsii. *Leach.* Zool. Misc., vol. ii, p. 34, pl. 72, fig. 2, 1815.
— — *Turt.* Brit. Biv., p. 200, 1822.
— — *Brown.* Brit. Conch. Illust., pl. 29, fig. 7, 1827.
Ency. Meth., pl. 218, fig. 6.

Spec. Char. Testâ tenui, ovato-oblongâ, extremitate compressiusculâ, anticè brevissimâ, posticè dilatatâ, subangulatâ; lineis incrementibus ornata.

Shell thin, of an oblong-ovate form, posterior portion somewhat compressed, dilated and sub-angulated, anterior extremity very short, concentrically striated, or lines of increase distinct and prominent.

Locality. Red Crag, Walton Naze. Recent, British and Mediterranean Seas.

About half a dozen specimens from the Red Crag, at Walton on the Naze, appear precisely in form to resemble what the authors of the 'Hist. of Brit. Mollusca,' seem to consider as entitled to specific distinction, and presuming they have good data for their determination, I have separated this from where it had been previously placed, as only a variety of *M. modiolus.* A greater curvature in the ventral margin, and the expansion on the posterior side, are deviations from the ordinary form of the larger and more common species, and these are, I presume, the principal characters relied upon for separation. On the exterior are a series of ridges or elevated lines of growth, the probable remains of the support of the bearded or fringed portion of the epidermis when in a recent state. The beaks in this specimen appear to be terminal, the anterior side of the shell not projecting beyond them, and in that character more resembling *Mytilus*, which it closely approaches in form; there is, nevertheless, a projection outwards, like the rest of the genus. The ventral margin is somewhat incurved, the dorsal portion of the shell a good deal flattened behind, and extending beyond the ligamental area, while the centre is tumid or inflated; the dimensions of the widest part, which is on the posterior side behind the ligament, is twice that of what it measures across the shell immediately behind the umbo.

3. MODIOLA PHASEOLINA, *Philippi*. Tab. VIII, fig. 4.

MODIOLA PHASEOLINA. *Phil.* En. Moll. Sic., vol. ii. p. 51, t. 15, fig. 14, 1844.
— — *Jeffreys.* An. Nat. Hist., vol. xix, p. 313.
— — *Forb.* and *Hanl.* Hist. Brit. Moll., vol. ii, p. 186, pl. 44, fig. 3, 1849.

Spec. Char. Testâ oblongo-ovatâ, lævigatâ, tenui, margine ventrali recto; subsinuato, dorsali subangulato, cardine crenulato.

Shell oblong-ovate, smooth and thin; ventral margin straight or subsinuated, dorsal margin subangulated; cardinal area crenulated: shell nacreous.

Locality. Coralline Crag, Sutton, and Ramsholt.

Recent, Britain, and Mediterranean.

The distinguishing character of this species appears to be the finely crenulated margin of the dorsal edge on the outside of the ligamental area, as the outer form or contour of the shell is variable like *M. modiolus,* from the young of which it could not be separated by any character which might not also be applied to that species; some specimens have but a short hinge line, with a somewhat rounded dorsal edge, and a subcylindrical or ovato-oblong outline, while in others there is a considerable angle on the dorsal edge at the posterior termination of the ligament, and the ventral margin is nearly straight, varying sometimes from that line a little, both outwardly and inwardly. The largest specimens which have a minutely crenulated hinge line do not exceed $\frac{3}{8}$ths of an inch, and all show a pearly texture. The umbo is generally terminal, although the anterior side will occasionally be seen to project beyond it.

This, as well as the preceding species, have been introduced in deference to the Malacologists, but it is very doubtful if they will not hereafter have both to be united with *M. modiolus.*

4. **Modiola costulata**, *Risso*. Tab. VIII, fig. 6.

Modiolus costulatus. *Risso*. Hist. Nat. de l'Europ. Merid., t. iv, p. 324, pl. xi, fig. 165, 1826, non bene.
Modiola costulata. *Phil.* En. Moll. Sic., vol. i, p. 70, t. 5, fig. 11, 1836.
— — *Id.* - - - vol. ii, p. 50, t. 15, fig. 10, 1844.
— Petagnæ. (*Scacchi*) sec. *Phil.* En. Moll. Sic., vol. ii, p. 51.
— costulata. *Webb* and *Bertholet.* Nat. Hist. des Iles Canaries, p. 103, pl. 7, B, figs. 23, 25, 1842.
— — *Jeffreys.* An. Nat. Hist., vol. xix, p. 313.
— cylindroides. *S. Wood.* Catalogue, 1840.
Crenella costulata. *Forb.* and *Hanl.* Hist. Brit. Moll., vol. ii, p. 205, pl. 45, fig. 1, 1849.

Spec. Char. Testâ minutâ, oblongâ, subcylindricâ, anticè angustata et ultra apicem productâ, medio lævi; in utroque latere costato-striatâ.

Shell small, oblong, subcylindrical, anterior side somewhat contracted, extending beyond the umbo, middle smooth, with large costated striæ upon both sides.

Longest diameter, $\frac{5}{8}$ths of an inch. *Shortest*, $\frac{2}{8}$ths.

Locality. Cor. Crag, Sutton.
Red Crag, Walton Naze.

Only one specimen in my cabinet has been obtained from the older or Coralline Crag Formation; but in the Red Crag at Walton it does not appear to be at all scarce, at least a couple of dozen have fallen to my lot, and in them a considerable range in variation may be detected.

Our shell appears to agree with the figure and description of *M. costulata*, in the first vol. of Philippi, which that author, in his second volume, has assigned to another species: amongst my specimens also are forms corresponding with what he considers to be specifically distinct, and they are therefore both introduced among the synonyma, as I am unable to separate into two species those which are found in the Crag; if, however, there be in the recent shells characters sufficient to justify a specific distinction, both forms seem to have been present in the seas that deposited the Red Crag, but from what is exhibited in the fossils, they may be fairly included in one species.

There can be no mistake in regarding this as distinct from either *M. discrepans* or *M. marmorata*, from both of which it differs in being more cylindrical, with also a greater curvature in the ventral margin. It is an elegantly-formed shell, the anterior side slightly projects beyond the umbo, somewhat tumid, with a rounded angularity crossing the shell diagonally from the beaks to the posterior part of the ventral margin, the anterior side is rounded, and deeply striated or ridged with about ten or twelve small ribs; the middle is plain, or only marked by lines of growth, while the greater half of the shell on the posterior side is covered with striæ in a radiating manner, these are so conspicuous at the margin as to produce somewhat large and distinct crenulations on the inner edge, most conspicuous a little behind the ligament, but they extend along the whole line of hinge or dorsal area; the posterior side in some specimens is much rounded, so as to give a cylindrical form to the shell, while in others there is an angular slope on the posterior side, from a little beyond the termination of the hinge line to the ventral margin, which gives a greater width to that part, thereby producing a different form, and which, in consequence, were that a permanent character, might be considered a distinct species, but my specimens are exceedingly variable, so as to present no marked distinction between the two.

5. Modiola sericea, *Bronn.* Tab. VIII, fig. 3.

Modiola sericea. *Bronn.* Ital. Tert. Geb., p. 122, No. 649, 1831.
— — *Phil.* En. Moll. Sic., vol. i, p. 71, t. 5, fig. 14, 1836.
— *Id.* - - - vol. ii, p. 52, 1844.
— — *Nyst.* Add. à la Faune. Conch., p. 444, No. 38, 1842.
— hyalina. *S. Wood.* Catalogue, 1840.
Mytilus sericeus. *Goldf.* Pet., vol. ii, p. 179, pl. 131, fig. 12, *a*—*c*, 1841.
— — *Nyst.* Conch. Foss. de Belg., p. 271, pl. 21, fig. 2, *b*—*e*, 1844.
— — *E. Sism.* Synop. Meth. An. Invert., p. 15, 1847.
Bronn. Ergeb. meiner. naturh.-ökon Reise, vol. ii, p. 620, sec. *Nyst.*

Spec. Char. *Testâ tenuissime, subhyalinâ, elliptico-ovatâ, tumidâ; valdè inæquilaterâ; striatâ, striolis exilibus confertis; umbonibus prominentibus recurvis; margine ventrali subrecto, tenuissime crenulato.*

Shell thin delicate, subhyaline, of an elliptical or ovate form, tumid; very inequilateral; covered externally with numerous close-set, extremely fine, radiating striæ; umbo projecting beyond the anterior side; ventral margin nearly straight and finely crenulated.

Locality. Cor. Crag, Ramsholt and Sutton.

It is very difficult to obtain specimens of this species in perfection, on account of its extreme thinness, although they appeared at Ramsholt to be by no means rare, but they are generally more or less broken or distorted.

This beautiful species is of an ovate or elliptical form, very tumid, excessively thin and semitransparent; it is covered over its whole surface with extremely fine radiating striæ, crossed occasionally by irregular lines of growth, but not regularly decussated; the ligamental area extends about half the distance of the dorsal portion, its termination forming a very obtuse angle; the umbo is terminal and somewhat prominent, curved, and slightly projecting beyond the anterior margin.

This appears at present to be known only as a fossil. My largest specimen measures an inch and a quarter in its longest diameter.

6. MODIOLA MARMORATA, *Forbes.* Tab. VIII, fig. 7.

MYTILUS DISCORS. *Da Costa.* Brit. Conch., p. 221, t. 17, fig. 1, 1778.
— — *Walker* and *Boys.* Test. Min. Rar., pl. 3, fig. 79, 1789.
— — *Poli.* Test. Utr. Sic., vol. ii, p. 211, pl. 32, figs. 15, 16, 1795.
— — *Donov.* Brit. Shells, vol. i, pl. 25, fig. 1, 1799.
— — *Mat.* and *Rock.* Linn. Trans., vol. viii, p. 111, pl. 3, fig. 8, 1807.
— — *Mawe.* Conch., pl. 13, fig. 5, 1823.
— — *W. Wood.* Ind. Test., pl. 12, fig. 39, 1825.
MODIOLA — *Turt.* Brit. Biv., p. 201, pl. 15, fig. 4, 1822.
— — *Brown.* Illust. Brit. Conch., pl. 29, fig. 10, 1827.
— — *S. Wood.* Catalogue, 1840.
— — ? *Gould.* Inv. Massach., p. 15, fig. 84, 1841.
— DISCREPANS. *Phil.* En. Moll. Sic., vol. i, p. 70, 1836.
— — *Id.* - - - vol. ii, p. 50, pl. 15, fig. 11, 1844.
— — *Payr.* Cat. Moll. Cors., p. 67, 1826.
— EUROPÆA. *D'Orb.* fide *Lovén.*
— TUMIDA. *Hanley.* Rec. Shells, vol. i, p. 241, pl. 12, fig. 39.
— MARMORATA. *Forbes.* Malac. Monen., p. 44, 1838.
— — *Brown.* Illust. Brit. Conch., 2d ed., pl. 27, fig. 10.
— — *Alder.* Cat. Moll. North. and Durh., p. 82, 1848.
MODIOLARIA — *Lovén.* Ind. Moll. Scand., p. 33, 1846.
CRENELLA — *Forb.* and *Hanl.* Hist. Brit. Moll., vol. ii, p. 198, pl. 45, fig. 4, 1849.

Spec. Char. Testá minutá, ovato-ellipticá, tumidá, tenui, fragili; utroque latere striatá, spatio submediano lævigato vel transversè striato; umbonibus minimis subterminalibus.

Shell small, ovate or elliptical, tumid, thin, and fragile; both sides radiatingly striated, with a smooth or rather transversely striated space between them; umbones small, subterminal.

Longest diameter, $\frac{3}{8}$ths of an inch.

Locality. Cor. Crag, Sutton.
Red Crag, Walton Naze.
Recent, Mediterranean, Britain, Scandinavia, and North America?

Small specimens and fragments of this species are abundant in the Coralline Crag at Sutton, and it appears to have been one of the commoner shells of that Period. There is no doubt, of this shell being identical with the recent British species, now determined not to be the *discors* of Linnæus, a name given to a larger shell (*Mytulus impactus, Herm.*) by the Swedish naturalist.

Our shell in the fossil state has become opaque, but it has retained its nacreous appearance; it is of an elliptical form, the anterior side being rather broader than the posterior, which is slightly narrowed off from the dorsal slope; the umbones are small, slightly inflected, with the anterior side projecting a little beyond them, the shell is somewhat regularly tumid, with a very slight flattening on the dorsal portion: the tripartite division of the exterior is of unequal dimensions, the posterior striæ covering nearly but not quite half the surface, while the anterior occupies rather a less space than the centre or naked compartment; the striæ or rays are large and rounded, numbering about a dozen or fourteen on the anterior side, with about double that number on the posterior portion: the whole shell is covered with transverse striæ or regular lines of increase, which prettily ornament the spaces between the ridges, and the edge of the shell is deeply crenulated on the anterior and posterior sides, or those portions which are covered with the radiating ridges; the tripartite division of the shell, is visible in the interior, and the number of the external striæ may be counted there. The edge of the ventral margin has a slight convexity, contracting a little towards the striated parts.

The differences between this species and the following are so evident, there can be no mistake, that shell being more compressed or less tumid, with the posterior side broader in proportion. The shell to which this approaches nearest, is *M. semi-nuda, Desh.*, 'Desc. des Coq. Foss. des Env. de Par.,' vol. i, p. 264, pl. 30, figs. 20—22, a fossil belonging to the Formations of the Older Tertiaries. I have not been able to obtain a specimen from the Paris Basin; but what I presume to be the same species in the Cabinet of Mr. Edwards, from the English Deposits, presents differences that may be regarded as specific. Mr. Edwards's shell is more regularly ovate, and is even thinner than our species, with fewer radiations on the anterior side, not having more than seven or eight, and these are broader, it is also, more regularly tumid than our own shell, which has somewhat of an obtuse angle on the posterior portion.

The shell figured and described by Dr. Gould, under the name of *M. discors*, seems to present but trifling differences with the British shell, judging from description alone; but it is considered to be distinct by British Conchologists, as well as by Dr. Lovén.

7. MODIOLA DISCORS, *Linnæus*. Tab. VIII, fig. 5.

MYTILUS DISCORS. *Linn.* Syst. Nat., ed. 12, p. 1159, No. 261, 1767.
— DISCREPANS. *Mont.* Test. Brit., p. 169, 1803.
MODIOLA DISCREPANS. *Turt.* Brit. Biv., p. 202, 1822.
— — *Desh.* 2d ed. Lam., t. vii, p. 23, 1835.
— — *Forbes.* Malac. Monens., p. 44, 1838.
— — *Möller.* Ind. Moll. Groenl., p. 19, 1842.
— — *Alder.* Cat. Moll. North. and Durh., p. 81, 1848.
MODIOLARIA DISCORS. *Lovén.* Ind Moll. Scand., p. 33, 1846.
CRENELLA DISCORS. *Forb.* and *Hanl.* Hist. Brit. Moll., vol. ii, p. 195, pl. 45, figs. 5, 6, and pl. 48, fig. 5, 1849.

Spec. Char. Testâ ovato-ellipticâ, subcompressâ, valdè inæquilaterâ, tenui; anticè et posticè striatâ, spatio mediano lævigato; latere postico latiore.

Shell ovato-elliptical, somewhat compressed, very inequilateral, thin; striated at both extremities, middle space smooth, posterior side of the shell broader than the anterior.

Longest Diameter, $\frac{1}{2}$ an inch.

Locality. Mam. Crag, Chillesford. Recent, Britain and Seas of Norway.

A specimen strongly resembling this species is in my Cabinet, obtained in the native bed of the Mammaliferous or Newer Crag Period, at Chillesford. The shells in that deposit are excessively fragile, and are preserved with difficulty. This specimen appears also to have lost a portion of its outer surface: there is, however, upon the exterior, traces of what the sculpture has been, and as far as it can be observed, it seems to correspond with that upon the recent shell, it is, therefore, appropriated to the above species without much doubt; and, as its congeners in the same deposit are such as we know to be its associates at the present day, it might fairly be expected in that Formation. In the recent state it is considered more of a Boreal form, with but a limited range to the Southward. The earliest appearance of this species is in the upper portion of the Crag, where it seems to have been by no means abundant. I have found it in the recent state upon the shore of the Coast of Suffolk, in pools of water, left by the retreat of the tide.

8. MODIOLA RHOMBEA, *Berkeley.* Tab. VIII, fig. 8.

MODIOLA PRIDEAUXIANA. *Leach.* Zool. Miscel., vol. ii, p. 35, 1815.
— — *Brown.* Brit. Conch. Illust., pl. 29, fig. 9, 1827.
— RHOMBEA. *Berkeley.* Zool. Journ., vol. iii, p. 229, Suppl. pl. 18, fig. 1, 1827.
— — *Thorpe.* Brit. Mar. Conch., p. 107, 1844.
— — *Brown.* Brit. Conch. Illust., 2d ed., p. 78, pl. 39, fig. 17.
— ASPERULA. *S. Wood.* Catalogue, 1840.
CRENELLA RHOMBEA. *Forb.* and *Hanl.* Hist. Brit. Shells., vol. ii, p. 208, pl. 45, fig. 3, 1849.

Spec. Char. Testâ minutâ ovato-oblongâ vel trapeziformi, tumidâ, inflatâ, crassâ; costulato-striatâ, sulcis vel striis divaricatis; anticè abbreviatâ, rotundatâ, posticè majiore, angulatâ; margine ventrali sinuato; natibus prominulis incurvis.

Shell small ovato-oblong or trapeziform, tumid, or inflated, covered all over with large or costulated bifurcating striæ; anterior side, short and rounded, posterior larger, and angulated; ventral margin sinuated, with incurved and slightly projecting umbones.

Greatest Diameter, $\frac{1}{6}$th of an inch.

Locality. Cor. Crag, Sutton. Recent, British Seas, and Coast of Sutherland.

This is considered by the authors of the 'Hist. of Brit. Mollusca,' as an extremely rare shell in the recent state, and somewhat of a modern addition to the *Marine Fauna*, of the British Isles. Although noticed by Dr. Leach as early as the year 1815, it has since rarely been met with and seldom seen in the Cabinets of collectors. It is not so in the fossil, but is very abundant in the rich depôt of small shells at Sutton.

The recent shell is said to be as much as a quarter of an inch in diameter: the largest of my fossil specimens, does not exceed the sixth of an inch in its extreme dimensions, measured diagonally from the umbo to the posterior part of its ventral margin. There is, nevertheless, but little doubt of their identity, as the only difference is that of size, the Crag specimens corresponding in all other characters with the recent shell. It is very much inflated: the two valves when united, having a greater diameter than is given when measuring from the dorsal to the ventral margin; the umbo is terminal, projecting a little beyond the anterior of the shell, and is slightly curved; it is somewhat rhomboidal in its contour, with a little obliquity towards the posterior side, and a slight indentation in the ventral margin, the posterior side forming an obtuse angle with the edge of the shell that contains the ligament; the exterior is ornamented with large prominent striæ, or rather small ribs which bifurcate, and are more numerous in the old than in the young shell, they are crossed and made somewhat rough by prominent and distinct lines of growth, at rather irregular distances, sometimes giving a decussated appearance to the shell; the prominent costulated striæ project beyond the margin, and give a deeply crenulated edge all round; the ribs are sometimes visible in the interior, although the specimens are often so thick as not to allow them to be seen on the inside; and in that case, the impressions formed by the muscles are deeply indented, that by the anterior adductor is comparatively very large. The ligament seems to have been a strong one, as a deep linear depression is formed within the dorsal margin. This shell has been dredged in the living state, in 20 fathoms water, off Penzance.

PECTUNCULUS,* *Lamarck*, 1791.

PECTUNCULUS POLYLEPTOGINGLYMUS (sp.) *List.*, 1687.
MACTRA? *Browne*, 1756.
ARCA (spec.). *Linn.*, 1767.
GLYCIMERIS. *Da Costa*, 1778. *Humph.*, 1797.
AXINÆA AXINÆODERMA. *Poli*, 1795.
TUCETA. *Bolton*, 1798, sec. *Herrm.*

Generic Character. Equivalve, orbicular, convex or lenticular, subequilateral, closed, thick and strong; externally smooth or ornamented with radiating striæ or costæ. Hinge teeth small, numerous, forming an arched or curved line, central denticles becoming obsolete in old shells. Ligament external, attached to a grooved area in each valve, with distant beaks. Impressions of the adductors two, lateral and strongly marked, that by the mantle entire, or without a sinus.

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* Etym. The diminutive of *Pecten*.

Animal orbicular, or of the form of the shell and capable of being entirely covered when the valves are closed, mantle with its margins simple and disconnected, somewhat enlarged in the anal regions; a large semilunar shaped foot with undulating edges, permitting an expansion into a subdiscoidal form. No byssus.

This is purely a marine genus, inhabiting waters of various depths, with an extensive geographical range; though it does not as yet appear to have been found in any of the very cold regions of the globe. In a recent state the shells are generally covered with a velvety epidermis, except about the umbones, where it is often worn off.

The species are not numerous, either recent or in a fossil state, but appear to have long been inhabitants of this planet, two or three are described by Colonel Portlock, from the Silurian Rocks of Tyrone, and others have been found in the Oolites and Green sand, but the shells are not of any magnitude, until the Tertiary Periods, in which as individuals they are largely developed, both in Europe and in the Upper Tertiaries of America.

This is a well-marked genus, and not likely to be confounded with any other, except *Limopsis,* from which, however, it may be distinguished by the ligamental area being simple, or only marked with angular or diverging lines, while in that shell the cartilage is more distinctly separated from the ligament, and placed in a triangular fossette immediately beneath the beaks.

The ligament in this genus occupies the entire space between the umbo and the hinge margin, not equally spread over the surface, but placed in diagonal, or rather in lines diverging from the beak towards the lateral margins, by which a deep impress or furrow is formed and left upon that part of the shell.

1. Pectunculus glycimeris, *Linnæus.* Tab. IX, fig. 1, *a—h.*

Bonanni. Recr. Ment. et Ocul., fig. 61, 1684.
Chama glycimeris Bellonii. *List.* Hist. Conch., lib. iii, pars 11, fig. 82, and fig. 80? 1687.
Pectunculus fossilis. *Dale.* Hist. and Antiq. of Harw., p. 291, t. xi, fig. 3, 1730.
Arca glycimeris. *Linn.* Syst. Nat., ed. 12, p. 1143, No. 181, 1767.
— — *Poli.* Test. Sicil., vol. ii, p. 144, t. 26, fig. 1; t. 25, fig. 19, 1795.
— — *Don.* Brit. Shells, vol. ii, pl. 37, fig. 2, 1800.
— — *Mat.* and *Rack.* Linn. Trans., vol. viii, p. 94, t. 3, fig. 3, 1807.
— — *W. Wood.* Ind. Test., p. 46, pl. 10, fig. 36, 1825.
— — *Mawe.* Lin. Syst. Conch., pl. 13, fig. 7, 1823.
— — *Burrow.* Elem. of Conch., p. 143, pl. 8, fig. 7.
— pilosa. *Linn.* Syst. Nat., ed. 12, No. 182, p. 1143, 1767.
— — *Poli.* Test. Sicil., vol. ii, p. 138, t. 26, fig. 2—4, 1795.
— — *Broc.* Conch. Foss. Subap., p. 487, 1814.
— — *Mat.* and *Rack.* Linn. Trans., vol. viii, p. 94, t. 3, fig. 4, 1807.
— — *W. Wood.* Ind. Test., p. 46, pl. 10, fig. 37, 1825.
Arca scripta. *Born.* Mus. Cœs. Vin., p. 93, t. vi, fig. 1, 1780.
— undata. *Chem.* Conch. Cab., vol. vii, p. 224, pl. 57, fig. 560, 1784.

Arca undata. *Broc.* Conch. Foss. Subap., p. 489, 1814.
— polyodonta. *Broc.* - - - p. 490, 1814.
— flammulata. *Renieri.* fide *Philippi.*
Glycimeris orbicularis. *Da Costa.* Brit. Conch., p. 168, p. 11, fig. 2, 1778.
Pectunculus glycimeris. *Turt.* Brit. Biv., p. 171, t. 12, fig. 1, 1822.
— — *Brown.* Illust. Conch. Gr. Brit., pl. 25, figs. 8, 9, 1827.
— — *Crouch.* Int. Lam. Conch., pl. 8, fig. 11, 1827.
— — *Reeve.* Conch. Icon. Pectunc., pl. 3, fig. 12.
— — *Dujard.* Mem. Geol. Soc. de Fr., t. ii, par. 11, p. 267, No. 1, 1837.
— — *Forb.* and *Hanl.* Hist. Brit. Moll., vol. ii, p. 245, pl. 46, figs. 4—7, 1849.
— pilosus. *Turt.* Brit. Biv., p. 172, t. 12, fig. 2, 1822.
— — *Schum.* Essai d'un Nouv. Syst. des Vers. Test., p. 172, pl. 19, fig. 3, 1817.
— — *Brown.* Illust. Conch. G. B., pl. 25, figs. 10, 11, 1827.
— — *Blainv.* Man. Malac., pl. 65 bis, fig. 3, 1825.
— — *Reeve.* Conch. Icon. Pectunc., pl. 3, fig. 13.
— — *G. Sowerby, Jr.* Conch. Man., fig. 134, 1843,
— — *G. Sow.* Genera, No. 5, fig. 1.
— — *S. Wood.* Mag. Nat. Hist., 1840, p. 13, fig. 7.
— — *Nyst.* Coq. Foss. de Belg., p. 247, pl. 19, figs. 6, 7, 1844.
— undatus. *Turt.* Brit. Biv., p. 173, t. 12, figs. 3, 4, 1822.
— decussatus. *Id.* - p. 173, t. 12, fig. 5.
— numarius. *Turt.* Brit. Biv., p. 174, t. 12, fig. 6, 1822.
— variabilis. *J. Sow.* Min. Conch., t. 471, fig. 1, 1824.
— — *Woodward.* Geol. of Norf., p. 43, 1833.
— — *Id.* Coq. Foss. de Belg., p. 249, pl. 20, fig. 1, *a—b*, 1844.
— — *Phil.* En. Moll. Sic., vol. ii, p. 45, 1844.
— polyodonta. *Goldf.* Pet. Germ., vol. ii, p. 161, t. 126, figs. 6 & 7, *a—d.*
— pulvinatus. *Brongn.* Vincent., p. 77, pl. 6, figs. 15, 16, 1823.
— — ? *Bast.* Bord. Foss., p. 77, No. 2, 1825.
— — ? *Dubois de Mont.* Conch. Foss. de Wolhyn., p. 64, pl. 7, figs. 7, 8, 1831.
— subobliquus. *S. Wood.* Mag. Nat. Hist., 1840, p. 233, pl. 13, fig. 6.
— transversus. ? *Dubois de Mont.* Coq. Foss. de Wolhyn., p. 65, pl. 7. fig. 9.
— numiformis. ? *Id.* - - - - p. 66, pl. 7, fig. 6.
— latiarea. *Michelotti.* fide *Sismonda.*
— pusillus? *Dujard.* Mem. Geol. Soc. de Fr., t. 2, pt. 2, p. 276, 1837.
Ency. Method., p. 310, figs. 2 & 3.
Arca. *Smith.* Strat. Identif. Craig, t. 2, fig. 7, 1816.

Spec. Char. Testá variabile, suborbiculatá, subovatá, transversá, sæpè obliquá subæquilaterá, compressá vel tumidá, costato-striatá ; margine crenulato.

Shell variable, suborbicular, elongate or transverse, often oblique, subequilateral, compressed or tumid ; striated ; margin crenulated.

Diameter, 3¼ inches.

Locality. Cor. Crag, Passim.
Red Crag, Passim.—Var. β, *subobliquus,* Walton Naze.
Mam. Crag, Thorpe, Bridlington (*Leckenby*).
Recent, Britain, and Mediterranean.

This is one of the most common and abundant shells in the Coralline as well as in the Red Crag Deposits. In the Coralline, the valves, as might be expected, are often found united.

The determination of this species is exceedingly difficult, and the form which was figured in the 'Mag. Nat. Hist.' (var. β), presented characters it was then thought sufficient for the establishment of a new one, but the recent species has been found to exhibit the same obliquity; this variety I have never seen from the Older or Coralline Crag, but it is one of the commonest shells at Walton on the Naze, where the two valves are frequently found united; it is generally thinner, and some specimens are very oblique, and this may be considered the limit of range in variation in one direction; var. *a* in the other; between these forms every imaginable gradation may be pointed out in almost any collection possessing a good series of this abundant Crag shell, so well named by Mr. J. Sowerby (*variabilis*). There is scarcely a possibility of giving a correct diagnosis of this species, but what some deviation may be pointed out, and in consequence of which the varieties have been made into several species, as may be seen in the above list of synonyma, all, it is presumed, belong to this species. Specimens are somtimes longer than they are broad, and *vice versâ*, some are lenticular, with but little tumidity, others are much inflated. The exterior is generally more or less ornamented with raised, radiating, and distant striæ, variable in number, producing a like variation in the number of crenulations upon the interior margin of the valves; in some they are as many as sixty, while in others they do not exceed thirty-five; neither is the number of teeth or denticles of the hinge a more permanent character, for in old specimens the ligamental area is pushed so far forward as to have obliterated all the central teeth, and they become almost toothless, not more than three or four remaining; while in some specimens as many as eighteen may be counted on each side of the umbo, they are prominent, somewhat angular, flattened on the top, and when perfect, generally crenulated on the edges; between each is a deep depression for the reception of those in the opposing valve, and in very young shells the hinge is almost entirely destitute of denticles (fig. 1, *e*). Every size may be readily obtained, and my cabinet contains a series varying from specimens less than the eighth of an inch to those in which the diameter is nearly three and a half inches, dimensions exceeding those generally obtained in our seas; and this magnitude may be seen in shells from the Coralline as well as the Red Crag Deposits, while the species seems to have been rare in the Norwich beds.

Some American Tertiary shells figured by Conrad under two or three different names, approach so closely to those of the Crag as to render the distinction doubtful, as far as regards representation alone.

In some of my specimens from the Coralline Crag, where the two valves are in their natural state a very perceptible difference may be observed, not only in one valve having a greater tumidity than the other, but the inflated valve has also a larger diameter. Perhaps the ovarium in these specimens occupied a position not quite central, thereby giving a little inequality to the valves.

There are nodules of indurated sandstone in my cabinet, which contain casts of what appear to be the interior of this species, and also those of *Isocardia cor.* where the shell has been absorbed or abstracted; these nodules were obtained on the beaches of Walton Naze and Felixstow, and were in all probability washed out of the Red Crag.

LIMOPSIS, *Sassi.* 1827.

ARCA (spec). *Brocchi.*
TRIGONOCŒLIUS. *Nyst et Galeotti,* 1835.
LIMNOPSIS. *Gray,* 1840.
PECTUNCULINA. *D'Orb,* 1844.
CRENELLA. *Herrmansen,* 1846.

Generic Character. Shell orbicular or obliquely ovate, convex or lenticular, equivalved, subequilateral, and closed. Hinge composed of numerous teeth, arranged in a more or less curvilinear direction, projecting and interlocking. Umbones distant. Cardinal area large and external, divided by a triangular fossette immediately beneath the umbo. Impression of the mantle entire, or without a sinus; those by the adductors subovate, and deeply impressed.

ANIMAL UNKNOWN.

The characters by which this Genus is distinguished from the preceding one is the triangular fossette in the centre of the ligamental area, separating the cartilage from the ligament; first proposed as of generic importance by Sassi, in 1827, according to Bronn, and his name has priority over that by MM. Nyst and Galeotti, which bears a date several years later. This peculiar character of the hinge was observed and pointed out by Brocchi in 1814, but of course considered by him as of specific value only, his shell being placed in the genus *Arca.* The separation of the ligament into two distinct portions, although both of these are placed exterior to the hinge line, appears equivalent to the otherwise more general distinction of this ligature, one portion being within the hinge line, while the other is on the outside. Eighteen species are enumerated by M. Nyst, one of which is recent from the Red Sea.

1. **Limopsis aurita**, *Brocchi.* Tab. IX, fig. 2.

Arca aurita. *Broc.* Conch. Foss. Subap., p. 485, t. xi, fig. 9, *a—b*, 1814.
Pectunculus auritus. *Defr.* Dict. Scien., t. xxxix, p. 224.
— — *Goldf.* Pet. Germ., v. ii, p. 163, t. 126, fig. 14, *a—b*.
— — *Phil.* En. Moll. Sic., vol. i, p. 63; vol. ii. p. 45.
— — *Risso.* Hist. Nat. des Princip. Prod. de l'Europ., t. iv, p. 318, 1826,
— sublævigatus. *S. Wood.* Catalogue, 1840.
— — *Morris.* Cat. Brit. Foss., p. 97, 1843.
Limopsis aurita. *Sassi.* Giorn. Ligust. (ex. *Bronn*), 1827.
— — *Bronn.* Leth. Geo., vol. ii, p. 935, t. 39, fig. 7, *a—b*, 1838.
— — *Sismonda.* Syn. Meth. Ped. Foss., p. 15, 1847.
Trigonocœlia sublævigata. *Nyst.* et *West.* Nouv. Rech. Coq. Foss. d'Anv., p. 12, pl. 2, fig. 15, 1839.
— — *Nyst.* Coq. Foss. de Belg., p. 244, pl. 26, fig. 2, *a—b*, 1844.

Spec. Char. Testâ obliquâ, rotundato-ovatâ, inæquilaterâ, sublævigatâ, auriculatâ; exilissimè striatâ, et tenuissimè decussatâ; cardine arcuata, dentibus 10—18*; margine integerrimo, acuto.*

Shell oblique, rounded ovate, inequilateral, nearly smooth, and glossy, with small auricles; externally ornamented with very fine striæ, crossed by distinct lines of growth; hinge line curved, with about 10 to 18 teeth; margin sharp and smooth.

Longest diameter, ½ an inch.

Locality, Cor. Crag, Gedgrave.

This species has recently been found in abundance in one locality of the Coralline Crag, but it appears restricted to that spot, it may possibly have lived on into the Red Crag period, as my cabinet contains one specimen from that Formation, which however is much waterworn.

It is subject to a good deal of variation in its outward form, but is always more or less obliquely oval, generally becoming especially so in the older specimens, while in some young shells the valves are nearly equilateral. The hinge is composed of a row of denticles, varying from ten to sixteen, those on the shorter or rounded side being the greater number, amounting to about nine, the outermost are angular and somewhat distant, while the inner ones are close set and vertical; on the other side they are fewer, not exceeding seven, sometimes not more than four, these are distant, much inclined, and nearly parallel to the hinge line, furthermore they are often rough and crenulated upon their edges. The exterior of the shell is smooth and even glossy when perfect, with faint but distinct radiating striæ and visible lines of growth, and the hinge line projects a little beyond the otherwise oval contour of the shell, giving it the appearance of auricles, hence its name; the inner margin is flattened, smooth, and perfectly free from crenulations, and the impressions by the adductors deeply seated; that on the shorter side small and ovate placed near the hinge, the other is larger and more distant; the fossette for the cartilage diverges from the umbo at an angle of about 90°.

In the young state the specimens have fewer teeth, and the shell, as before stated, is less oblique, resembling the young of *Pectunculus,* from which it may be distinguished by its smooth and acute margin at all ages; while in the very small or young specimens of *P. glycimeris* the crenulated edge may be always seen. Some specimens are more tumid than others, but none are much inflated, and the exterior is smooth and perfect, except where it has been eroded, when the rays are more displayed, giving it there a granulated or decussated appearance, like *Arca aurita* of Brocchi, from which it appears to differ only in size.

The remains of red-coloured bands may be seen upon some specimens as if the shell had been so ornamented when in a living state, or perhaps it was of one uniform colour, a part of which only has been abstracted.

Trigonocœlia Goldfussii, Nyst, from Kleyn Spauwen, much resembles our shell, but is probably specifically distinct; it has its margin obsoletely crenulated, and the denticles are more numerous, with a slight difference in their arrangement.

LIMOPSIS PYGMÆA, *Philippi.* Tab. IX, fig. 3.

PECTUNCULUS PYGMÆUS. *Phil.* En. Moll. Sic. vol. i, p. 63, t. 5, fig. 5, 1836; not *Lamarck.*
— — *Id.* - - - vol. ii, p. 45, 1844.
— — *S. Wood.* Mag. Nat. Hist., New Series, vol. iv, p. 234, pl. 13, fig. 5, 1840.
— — *Id.* Catalogue, 1840.
— — *Goldf.* Pet. Germ. vol. ii, p. 162, t. 126, fig. 11, *a—c.*
— — *Morris.* Cat. Brit. Foss., p. 97, 1843.
TRIGONOCŒLIA DECUSSATA. *Nyst et West.* Nouv. Rech. Coq. Foss. d'Anv., p. 12, No. 29, pl. 2, fig. 16, 1839.
— — *Nyst.* Coq. Foss. de Belg., p. 245, pl. 18, fig. 7, *a—d,* 1844.
LIMOPSIS PYGMÆA. *Sism.* Syn. Meth. Ped. Foss., p. 15, 1847.

Spec. Char. Testâ minutâ, obliquâ, inæquilaterâ, subtrapeziformi, gibbosâ, crassâ, auriculatâ; transversim sulcatâ, striis radiantibus tenuissimis, subobsoletis; margine crenulato, dentibus circa decem.

Shell small, oblique, inequilateral, subtrapeziform, gibbous, thick, and strong; hinge line straight, furnished with about ten teeth; externally covered with fine and nearly obsolete radiating striæ, crossed by more distant and distinct lines of increase; margin crenulated.

Longest diameter, ¼ of an inch.

Locality. Cor. Crag, Sutton.

This species, as far as I know, is restricted to a single locality, where it is one of the most abundant shells, and the two valves are often found united. I have little doubt it is the same as Philippi's Sicilian fossil, judging from the figure he has given; the Belgian shell appears rather larger or badly represented, but from description it is probably the same. Our shell may be further described as being very tumid, the depth of the valves united equals the width of the hinge line; its dental formula consists of about ten teeth, six upon the anterior or rounded side, these are placed nearly vertical, or forming an obtuse angle, and very prominent in the centre, the four teeth on the posterior or produced side are much inclined and nearly parallel with the hinge line, they are also obtusely angular, interlocking between those of the opposite valve, and by their prominence keeping the two portions united; hinge margin with a row of crenulations deeper, larger, and more visible within upon the posterior side: when the shell is perfect the exterior is finely decussated, the radiating striæ not being more prominent than the lines of growth, but when the exterior coating is removed, which is generally the case more or less, the surface is strongly rayed or costated. In the young state the shell is less tumid than when full grown and less oblique. The muscular impressions are unequal in size and suborbicular, the anterior one or that upon the shorter side is situated close up to the hinge line; the one on the posterior or opposite side is larger and much nearer to the ventral margin.

This shell in form and magnitude bears a resemblance to *Pectunculus nanus,* Deshayes, an Eocene fossil from the Paris Basin, figured and described in his 'Hist. des Coq. Foss. des Env. de Paris, vol. i, p. 226, t. 36, figs. 4, 5, 6; but judging from the figure as well as from the description, there appears a different arrangement of the teeth or denticles, those of the French shell have the greater number upon the larger or produced side, amounting to as many as six, with only three or four upon the other or shorter side, and are less oblique, thus reversing the dental arrangement of the Crag shell; and the French fossil is said to be thin and fragile, while ours is thick and strong. The triangular fossette of the Crag shell is deep, and forms an angle less than 90°, and the margin of the shell is perfectly closed all round.

NUCINELLA, *S. Wood.*

NUCULA (sp.). *Deshayes,* 1829.
PLEURODON. *S. Wood,* 1840.
NUCULINA. *D'Orbigny,* 1845, sec. *Gray.*

Gen. Char. Shell equivalve, inequilateral, closed, ovate or subtrigonal; anterior side short, truncate; posterior produced, ovate or subangular; hinge line broad slightly curved, furnished with few teeth: one large lateral tooth on the posterior side. Ligament external.

ANIMAL UNKNOWN.

The diagnosis of this was drawn up from what may be considered as scarcely sufficient materials for the distinction of a group of animals, denominated a Genus, being founded upon but one species; it presents, however, such marked differences in character from any genus hitherto established, that I was unable to find a position for my little shell when it was first described. The outward trigonal form, as well as possessing a linear series of denticles, seem to point out its place as near to *Nucula* from which it differs essentially, in having an external ligament, and one large lateral tooth upon the anterior side.

The shell is of a nacreous texture within, and was, probably, covered with an epidermis in the recent state. The ligament is placed on the posterior side of the umbo, upon a small projecting portion of the shell, and the animal was without prolonged siphonal tubes, the line impressed by the edge of the mantle being like that of *Nucula,* without any indentation. There are no recent species, that I am acquainted with, possessing such a dental arrangement, and its true position is of course conjectural. The linear teeth and external ligament resemble *Pectunculus,* with a form like that of *Nucula.*

1. NUCINELLA MILIARIS, *Deshayes.* Tab. X, fig. 4, *a—c.*

NUCULA MILIARIS. *Desh.* Coq. Foss. des Env. de Par., tom. i, p. 225, pl. 36, figs. 7-9, 1829.

PLEURODON OVALIS. *S. Wood.* Illust. in Mag. Nat. Hist., 2d Series, vol. iv, p. 231, pl. 13, fig. 1, 1840.

— MILIARIS. *S. Wood.* Catalogue, 1840.

Spec. Char. Testâ minimâ, subovatâ, lævigatâ, politâ, tumidâ; posticè subtruncatâ, anticè productiore, rotundato-ovatâ: dentibus 5—6 *magnis, obtusis.*

Shell minute, subovate, smooth, glossy, and tumid; posterior side short, subtruncate, anterior large, roundedly ovate; teeth 5—6, large and obtuse.

Diameter, $\frac{1}{10}$ of an inch.

Locality. Paris Basin, Grignon.
Cor. Crag, Ramsholt, and Sutton.

This pretty little shell is by no means rare at either of the above British localities, and at the former (Ramsholt), the valves are often found united, the large and prominent teeth with which they are furnished having kept them in their natural position.

It is one of the very few of our Crag Molluscs, that dates its existence from the Older Tertiaries, or what is called the Eocene Period; as there is reason to believe the species left in the Paris Basin is the true progenitor of our little shell, while it appears to have died out before the severer conditions of the Red Crag Period had set in: although so small a shell, it would not readily be found, unless abundant, in a deposit so disturbed.

As, however, some differences exist between the Crag Fossil, and what is here considered its specific parent, it may be necessary to give a more detailed description and to point out what, perhaps, might be regarded by some Conchologists as of sufficient importance to keep them distinct.

Our little shell in its outward form, slightly resembles a minute specimen of *Nucula nucleus,* except, that it is more tumid; the anterior side constitutes nearly the whole of the shell, the posterior being cut off by an almost straight line from the umbo to the ventral margin. The hinge is composed of five or occasionally six teeth in the right valve, with six or sometimes seven in the left, these are arranged in a slightly curved line extending on both sides of the beak, three on each side; those on the posterior or shorter side are placed rather closer together than those on the anterior one, they are prominent, obtuse, and large compared with the size of the shell; those in the centre standing nearly perpendicular to the line of hinge, while the outer ones on both sides have their widest portion in an opposite direction, all placed, of course, so as one set can be interposed between those of the opposite, when the valves are closed. The lateral tooth of the right valve has a deep depression between it and the margin for the reception of a large tooth of the left valve. In a specimen of the French Eocene Fossil in my own cabinet, the teeth do not appear to be quite so obtuse as in the Crag shell, and the umbo is somewhat sharper and more terminal, with a rather more angular outline, the posterior side is apparently more truncated or straight, while the shell is nearly transparent.

A species passing out of one Period, where the animals or the remains of them, are of a nature to indicate conditions differing materially from those of another Period into which it is supposed to have had its existence prolonged, and so far removed as to have almost its entire Fauna formed upon a different type, would in all probability be affected in some degree by the change, so as to produce a slight alteration in its calcareous covering, such as would constitute what is called a variety, and these characters might become permanent under the continuance of those altered conditions; but should we not be permitted so to undermine specific integrity, we may at least be allowed a latitude in variation, that is ordinarily conceded to the examination of existing forms, and the differences between the shells of the two periods, which are here considered as identical, is less than is oftentimes presented to us by individuals of undoubtedly the same species in the Crag deposits; even in those recent species that appear to be admitted by almost general consent, as having originated in the earliest Tertiary Periods, a difference may be detected between the older and the more recent specimens, showing those animals that are apparently possessed of capabilities of endurance beyond their contemporaries, have not been able to maintain in strict integrity the supposed unvarying characters originally impressed upon them; all, however, that is contended for here is, that no greater restriction in regard to the limits of variation ought to be imposed upon the line of specific demarkation, merely from differences in Geological Periods, than is granted to deviations among specimens from the same deposit.

Arca,* *Linnæus*, 1758.

Parallelopipedum. *Klein*, 1753.
Anomalocardia. *Id.* (not *Schum*).
Cibota. *Browne*, 1756.
Pectunculus. *Adanson*, 1757.
Arca. *Linnæus*, 1758.
Amygdalum. *Chemnitz*, 1784.
Daphne and Daphnoderma. *Poli*, 1795.
Trisidos. *Bolten*, 1798.
Cucullœa. *Lam.*, 1801.
Arcites. *Martin*, 1809.
Trisis. *Oken*, 1815.
Cyphoxis. *Rafinesque*, 1819.
Arcacites. *Schlot.*, 1820.
Byssoarca. *Swainson*, 1820.
Navicula. *Blainv.*, 1825.
Rhomboides. *Id.*
Scaphula. *Benson*, 1834, not *Swainson.*
Argina? *Gray*, 1840.
Barbatia. *Id.*
Lunarca? *Id.*
Litharca. *Id.* 1844.
Senilia. *Id.*
Scaphura. *Id.*
Isoarca. *Münster*, 1843.
Andara. *Gray*, 1847.
Scapharca. *Id.*

Generic Character. Shell inequilateral, generally equivalve, more or less quadrate or trapezoidal, sometimes closed; at others, with an opening at the ventral margin, thick and strong; externally striated or costated. Umbones distant. Hinge linear, with numerous close-set interlocking teeth. Ligamental area generally large and broad, with angular grooves. Palleal impression entire.

Animal oblong, edges of mantle disconnected, simple or fringed, without siphonal tubes, a large and bent elongated foot with a groove capable of expanding into a disk-like form, and a gland at its base for the production of a byssus. Byssus compact.

Animals of this genus generally spin a substance for their attachment, but many are found located in rocks or holes of shells. Some species have a considerable opening at the ventral margin, in consequence of which, those more strongly marked with that character were placed in a separate genus, under the name *Bysso-arca;* but in individuals of the same species, this opening is subject to great variation, being large in some, while in others it is nearly obliterated.

M. Nyst has published a synoptical table of this genus, in which he has enumerated 459 species, 162 of these are recent, whilst the others are extended through almost every Period, commencing with the Upper Silurian, and ranging through all the intermediate Formations: although some few of these, are probably, only varieties, such an extensive genus might naturally be expected to have a large geographical range; the recent species are found in all parts of the world, though not equally distributed, nearly one hundred being found in the equinoctial regions; and its vertical range, is also very extensive, some being found under stones at low water mark, while others have been met with attached to rocks as deep as eighty fathoms.

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* Etym. So called from its Boat-like form.

1. Arca tetragona, *Poli.* Tab. X, fig. 1, *a—d.*

Arca tetragona. *Poli.* Test. Sic., vol. ii, p. 137, pl. 25, figs. 12, 13, 1793.
— — *Turt.* Brit. Biv., p. 166, pl. 13, fig. 1, 1822.
— — *Payr.* Cat. Moll. Cors., p. 61, No. 105, 1826.
— — *Desh.* 2d ed. Lam., t. vi, p. 461, 1835.
— — *Forbes.* Malac. Monen., p. 41, pl. 3, 1838.
— — *Id.* Report on Ægean Invert., p. 181, 1843.
— — *Phil.* En. Moll. Sic., vol. i, p. 57, 1836.
— — *Reeve.* Conch. Icon. Monog. Arca, pl. 15, fig. 100, *a—b.*
— — ? *Menke.* Moll. Nov. Holl. p. 37, No. 208, 1843.
— Noæ. *Mont.* Test. Brit., p. 139, pl. 4, fig. 3, 1803.
— — *Don.* Brit. Shells, vol. v, pl. 158, figs. 1, 2, 1804.
— — *Brown.* Brit. Conch. Illust., pl. 25, figs. 1-3, 1825.
— — *S. Wood.* An. and Mag. Nat. Hist., vol. iv, New Series, p. 231, pl. 13, figs. 2, & 2*a*, 1840.
— — *Morris.* Cat. of Brit. Foss., p. 78, 1843.
— fusca. *Mont.* Test. Brit. Sup., p. 51, 1808 (not *Reeve*).
— — *W. Wood.* Ind. Test., p. 45, pl. 9, fig. 14, 1825.
— — *Flem.* Brit. An., p. 397, 1828.
— — *Thorpe.* Brit. Mar. Conch., p. 101, 1844.
— cardissa. *Desh.* 2d ed. Lam., t. vi, p. 463, 1835.
— — *Alder.* Cat. Moll. North. and Durh., p. 79, 1848.
— navicularis. *Desh.* 2d ed. Lam., t. vi, p. 462, 1835.
— — *Phil.* En. Moll. Sic., vol. ii, p. 42, 1844.
— — *Lovén.* Ind. Moll. Scand., p. 33, 1846.
— Britannica. *Reeve.* Conch. Icon. Monog. Arca, pl. 15, fig. 98.
— — *Nyst.* Tab. Syn. des Arches. Viv. et Foss., p. 14, No. 47, 1847.
— papillosa. *Smith.* Mem. Wern. Soc., vol. viii, pl. 1, fig. 19, 1838.
Balanus Bellonii. *List.* Hist. Conch., lib. iii, fig. 207, 1687.
Ency. Meth., pl. 308, fig. 3, *a—b.*

Spec. Char. Testá oblongá, valdè inæquilaterá, costato-striatá, et transversim decussatá, anticè rotundatá, posticè angulatá; cariná posticá eminente, acutá; apicibus remotis incurvis; margine ventrali hiante.

Shell oblong, very inequilateral, with costated striæ, decussated by distinct lines of growth; anterior side rounded, posterior angulated, with a prominent keel or ridge from the umbo to the posterior ventral margin; umbones distant, incurved; ventral margin gaping.

Largest diameter, 1 inch.

Locality. Cor. Crag, Sutton, Ramsholt, and Sudbourn.
Red Crag, Sutton. Recent, Scandinavia, Britain, and Mediterranean.

Very small specimens are by no means rare in the Coralline Crag; but I have met with very few examples of the adult shell. These small or young specimens are very regular in form, being much elongated transversely, of a somewhat rhomboidal shape, the anterior side slopes a little from the extremity of the hinge line, rounding at the ventral margin, while the posterior side is angular, pointed and projecting; the ventral margin being nearly straight, or with a very little inflection. A full grown specimen found in the Red Crag (fig. 1, *a—b*), is very regular in form, and all its ornamental striæ beautifully preserved: the rays or costulated striæ are close and numerous upon the posterior half of the outer side of the umbonal ridge, while they are larger and more distant upon the anterior half; and within the prominent ridge, that slopes from the umbo to the posterior ventral margin, the rays are large and few, amounting to about four or five, and are placed in pairs; they project beyond the posterior margin, giving it a jagged or indented edge. A long line of teeth or crenulations occupy the edge of the hinge margin, they are numerous and vertical on the anterior or shorter side, fewer or more distant, and strongly inclining on the posterior side. The ligamental area is large and concave removing the umbones far apart; this space is ornamented with deep and angular lines diverging from the umbo, in some they are few and deeply impressed, while in others they are more numerous. One specimen in my Cabinet, from the Coralline Crag at Gedgrave (fig. 1, *c*), precisely resembles the distorted specimens found occasionally upon our own Coast, in holes or crevices of rocks, and in which the regularity of form has been interrupted, and the surface much abraded by frequent movements in a confined position, thus producing so great an alteration in the exterior of the shells as to have induced some authors to consider them distinct. In some of these full grown and distorted specimens, the ventral margin is deeply indented or sinuated. They are said by British Conchologists to be regular in form when free, and only distorted when confined to the crevices of rocks.

I have entered it among my synonyma upon the authority of Menke, who gives it as one of the existing species from the North Western Coast, New Holland. He has enumerated several other European shells from that part of the world.

2. ARCA LACTEA, *Linnæus*. Tab. X, fig. 2, *a—b*.

ARCA LACTEA. *Linn.* Syst. Nat., ed. 12, No. 173, p. 1141, 1767.
— — *Da Costa.* Brit. Conch., p. 171, pl. 11, fig. 5.
— — *Chem.* Conch. Cab. t. vii, p. 200, t. 55, fig. 547, 1784.
— — *Don.* Brit. Shells, vol. iv, pl. 135, 1803.
— — *W. Wood.* Ind. Test., p. 45, pl. 9, fig. 24, 1825.
— — *Brown.* Illust. Conch. Gr. Brit., pl. 25, fig. 6, 1827.
— — *Mawe.* Linn. Syst. Conch., pl. 13, fig. 4, 1823.
— — *Phil.* En. Moll. Sic., vol. i, p. 57; vol. ii, p. 42.
— — *Forbes.* Rept. on Ægean Invert., p. 181, 1843.
— — *Reeve.* Conch. Icon. Arca, pl. 17, fig. 116.
— — *Dujard.* Mem. Geol. Soc. de France, t. ii, pt. 2, p. 266, 1837.
— — *Hanley.* Recent Shells, vol. i, p. 154, pl. 9, fig. 24.
— MODIOLUS. *Poli.* Test. Sic., vol. ii, p. 137, pl. 25, figs. 20, 21, 1795.
— — *Turt.* ed. Linn., vol. iv, p. 251, 1806.
— PERFORANS. *Turt.* Conch. Dict., p. 9, 1816.
— — *Id.* Brit. Biv., p. 169, t. 13, figs. 2, 3, 1822.
— GAIMARDII. *Payr.* Cat. Moll. Cors., p. 61, pl. 1, figs. 36—39, 1826.

ARCA GAIMARDII. *Desh.* Exp. Sci. Algiers Moll., pl. 124, figs. 8—11.
— QUOYII. *Payr.* Cat. Moll. Cors., p. 62, pl. 1, figs. 40—43, 1826.
— — *Desh.* Append. to Lyell's Princ., 1st ed., vol. iii, p. 10, 1833.
– LACTANEA. *S. Wood.* Mag. Nat. Hist., New Series, vol. iv, p. 232, pl. 13, fig. 3, 1840.
— — *S. Wood.* Catalogue, 1840.
— — *Morris.* Cat. Brit. Foss., p. 78, 1843.
— NODULOSA? *Broc.* Conch. Foss. Subap., p. 478, t. ii, fig. 6, *a*—*c*, 1814.
— — ? *Dubois.* Wolhyn. Podol., p. 64, pl. 7, figs. 21, 22, 1831.
— STRIATA. *Reeve.* Conch. Icon. Arca, pl. 17, fig. 121.
List. Hist. Conch., lib. iii, fig. 69, 1685.
Dale. Hist. and Antiq. of Harwich, p. 291, 1730.
Adanson. Voy. au Senegal, p. 250, pl. 18, fig. 8, 1757.
not ARCA LACTEA, *Brander.* Foss. Hant., pl. 8, fig. 106.

Spec. Char. Testâ ovato-oblongâ, interdum subquadratâ, anticè rotundatâ, posticè obliquè truncatâ; decussato-striatâ; striis radiantibus eminentioribus; area cardinali mediocre profunda; margine ventrali subrectâ.

Shell ovato-oblong, sometimes nearly square, anterior side rounded; posterior obliquely truncated; covered with striæ, crossed by transverse lines of growth; radiating striæ the most prominent; cardinal area not large, with a rounded or obtuse ridge from the umbo backwards; ventral margin nearly straight.

Longest diameter, ¾ of an inch; *height*, ½ an inch.

Locality. Cor. Crag, Sutton.
Red Crag, Sutton, Walton Naze. Recent, Britain and Mediterranean.

In the sandy portion of the Coralline Crag at Sutton, a locality that has yielded so many of the smaller and more fragile species of Mollusca, numerous small or young individuals of this species may be obtained. My largest specimen was found in the Red Crag at Walton Naze, and measures an inch in its transverse or largest diameter but it is an old and somewhat mutilated individual.

When my Catalogue was compiled this was considered to be a distinct species, in consequence of a difference in the size of the ligamental area, as in the Crag shell it is smaller than in the generality of recent specimens, the resemblance was, however, so great in all other respects, that the name of *lactanea* was given from its near relationship. I have since seen specimens of the recent shell in which this distinction is lost, and have therefore now united it with the long-known recent species. My specimens from the Crag are very regular in form, and I have not met with any fossils resembling the distorted varieties which have been erected into species by Payraudeau under the names of *A. Quoyii* and *A. Gaimardii*, the greatest variation being slight differences in proportional dimensions, some occasionally being rather more transverse than others.

Arca nodulosa, Müller, given as an inhabitant of the Seas of Norway, by Dr. Lovén, corresponding probably with the Calabrian fossil *A. aspera*, Phil., appears to differ from our shell in being larger and broader on the posterior half, with a more deeply and regularly decussated exterior, but with a small and narrow ligamental area. *Arca nodulosa,* Brocchi, seems to belong to our present species, as does also, in all probability, the one figured and described under that name by Dubois, judging from his short description and small figure.

ARCA PECTUNCULOIDES, *Scacchi.* Tab. X, fig. 3, *a—b.*

ARCA PECTUNCULOIDES. *Scac.* Ann. Civ. delle Due Sicil., vol. vi, p. 82, 1834, fide *Nyst.*
— — *Scacchi.* Notizia, p. 25, t. 1, fig. 12, sec. *Phil.*
— — *Phil.* En. Moll. Sic., vol. ii, p. 44, t. 15, fig. 3, 1844.
— — *Jeff.* Ann. Nat. Hist., vol. xix, p. 313.
— — *Lovén.* Ind. Moll. Scand., p. 34, 1846.
— — ? *Mich.* Prec. Faun. Mioc., t. 3, fig. 14, 1847.
— — *Sismonda.* Syn. Meth. Pedm. Foss., p. 16, 1847.
— — *Nyst.* Tab. Synop. des Arches Viv. et Foss., p. 54, No. 300, 1847.
— RARIDENTATA. *S. Wood.* Mag. Nat. Hist., New Series, vol. iv, p. 232, pl. 13, fig. 4, 1840.
— — *Thompson.* Ann. Nat. Hist., vol. xviii, p. 385.
— — *S. Wood.* Catalogue, 1840.
— — *Morris.* Cat. Brit. Foss., p. 78, 1843.
— — *Forb.* and *Hanl.* Hist. Brit. Moll., vol. ii, p. 241, pl. 45, fig. 8, 1849.
— PUSILLA. *Nyst.* Coq. Foss. de Belg., p. 261, pl. 20, fig. 6, 1844.
CUCULLŒA PUSILLA. *Nyst.* Rect. Coq. Foss. Prov. d'Anv., p. 14, pl. 3, fig. 55, 1835.

Spec. Char. Testâ parvâ, inæquilaterâ, ovato-rhomboideâ, gibbâ; striis exiguis, decussatis; areâ ligamenti parvâ, apicibus reflexis; cardine recto, utrinque tridentato; margine ventrali subsinuato.

Shell small, inequilateral, ovato-rhomboidal, gibbous; ornamented with fine decussating striæ; ligamental area small, umbones inflected; hinge line straight, furnished with three teeth on each side; ventral margin subsinuated.

Largest diameter, $\frac{1}{6}$th of an inch.

Locality. Cor. Crag, Sutton. Recent, Britain, Mediterranean, and Ægean Seas.

This elegant little shell is another species, but rarely found in the British Seas, and which may perhaps be one of those we might consider to be in a specific decline, or the dying out of what was once largely developed in these latitudes. In the Coralline Crag at Sutton this is one of the most abundant fossils, and I have obtained the separated valves by hundreds.

It is stated by the authors of the 'Hist. of Brit. Moll.' to be slightly inequivalved. In the fossil state I have never been able to obtain a specimen with the valves united. There does not appear to be any doubt of its identity with the living British species, and a single valve obtained from a considerable depth in the Ægean Sea, obligingly given to me by Professor E. Forbes, corresponds in all respects with the Crag shell.

Where the specimens are so abundant, differences of form may naturally be expected, some may be selected that are more elongated and less tumid than others, and my two most extreme variations are here represented: all give indications of an opening for a byssus by an indentation or sinuosity on the anterior side of the ventral margin; this character is imperfectly represented in the Mediterranean fossil by Philippi, nor is it well shown in that by Nyst, although the probabilities are they all belong to the same species: both of these authors speak of their shell as being by no means abundant. When perfect, it is ornamented with distinct radiating striæ, the largest and most prominent at the two extremities; they are crossed by lines of growth somewhat irregular, and the surface is imperfectly cancellated. Upon the hinge line, on the anterior side, are three or four rather large and prominent teeth, which slope at an angle of about 45°, while those on the posterior, amounting to the same number and equally prominent, are nearly parallel to the hinge margin; in some small or young specimens, these teeth or prominences do not amount to more than two on each side, and all so arranged that when the valves are united, the one set interlock with those of the opposite valve. The place for the ligament is very small, and in perfect specimens there may be seen an entire row of crenulations just within the ventral margin of the shell; and a prominent ridge slopes down the interior from beneath the umbo, probably formed by the inner edge of the adductor muscle on the anterior side. In old specimens the mark of the mantle is deeply impressed, running parallel to the outer edge.

NUCULA,* *Lamarck,* 1799.

GLYCIMERIS (sp.). *Da Costa,* 1778.
TELLINA and DONAX (sp.). *Gmel.*
ARCA (sp.). *Linn.*
POLYODONTA. *Megerle,* 1811.

Generic Character. Shell equivalve, very inequilateral, ovato-trigonal, generally transverse, closed, nacreous, and in the recent state covered with an epidermis; often smooth, sometimes striated, or variously ornamented upon the exterior: hinge line more or less angular, furnished with a series of sharp, elevated, and angulated teeth, arranged on each side of the umbones, interrupted by a central and internal spoon-shaped projection, upon which is placed the ligament. Impression by the mantle without a sinus.

Animal of the form of the shell, having the edges of its mantle plain disconnected, and without siphonal tubes. Foot large, and capable of expanding into an ovate, pedunculated disc, with fimbriated edges, and by means of this organ it is capable of a considerable degree of locomotion, creeping like a Gasteropod at the bottom of the water.

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* Etym. *Nucula,* a little nut.

Since the original establishment of the genus by Lamarck, it has been much curtailed, and is now restricted to those shells with a pectiniform or denticulated hinge, having the posterior portion, as it were, cut off; the lines of denticulations forming nearly a right angle, and the animal being without the posterior siphonal tubes; consequently there is no indentation in the impression formed by the muscles of the mantle.

The genus thus restricted is in a recent state rather sparingly distributed, although found in the seas of both hemispheres. As fossil, it has been obtained low in the Secondary Formations.

The species in a living condition are inhabitants of the sea at all depths, some being found near low water mark, while others are truly pelagian, and have been observed in the deepest regions Mollusca are known to frequent. Mr. Garner, in his 'History of the Lamellibranchiata,' says, there is a distinct pinnate process in the mantle of the animal, for the purpose of secreting the numerous teeth of the hinge; these teeth are prominent, sharp pointed, and angular, the angle being directed towards the umbo from both sides.

1. NUCULA LÆVIGATA, *J. Sowerby*. Tab. X, fig. 8, *a—b*.

NUCULA LÆVIGATA. *J. Sow.* Min. Conch., t. 192, figs. 1, 2, 1818.
— — *Goldf.* Pet. Germ., vol. ii, p. 157, pl. 125, fig. 19, *a—c*.
— — *S. Wood.* Illust. Mag. Nat. Hist., New Series, vol. iv, p. 296, 1840.
— — *Id.* Catalogue, 1840.
— — *Nyst.* Add. à la Faune Conch. de Belg. (Bull. Acad. de Brux, t. ix, p. 450), 1842.
— — *Morris.* Cat. Brit. Foss., p. 94, 1843.
— — *Nyst.* Coq. Foss. de Belg., p. 228, pl. 17, fig. 8, *a—b*, 1844.

Spec. Char. Testâ transversâ, ovatâ, valdè inæquilaterâ, lævigatâ, tenui, margaritaceâ, clausâ; anticè brevi, subangulatâ; posticè productiore, rotundatâ; margine ventrali integerrimo.

Shell, transverse, ovate, very inequilateral, smooth, thin, nacreous, and closed; anterior side short, sloping, or angulated; posterior much produced and rounded; ventral margin without crenulations.

Longest diameter, $1\frac{3}{8}$ths of an inch; *height*, 1 inch.

Locality. Cor. Crag, Sutton..
Red Crag, Walton Naze.

This is the largest species of the genus that I am acquainted with, either in the recent or fossil state, it appears to have attained its full development in the Red Crag, as in the Deposits of that Period at Walton Naze specimens are by no means rare; it is found also in the older or Coralline Crag, where, however, they are few in number and small in size.

M. Deshayes has quoted this as synonymous with *N. ovata*, an Eocene species from the Paris Basin; there are, however, marked differences between the two, sufficient to keep them specifically distinct. The older shell has a crenulated margin, with other characters of minor importance by which it may also be distinguished, while the Crag one has its margin perfectly smooth. A shell in the Cabinet of Mr. D'Urban, found in the Eocene Formation at Bracklesham, strongly resembles our species, in having its margin free from the slightest appearance of crenulations, but it differs in being rather less transverse and more tumid, with the posterior ventral margin less angular and pointed, approaching in the last character the specimens from the Coralline Crag; these differences appear to be sufficient for specific distinction, and, as yet, I have not seen any shell with which it can be fairly identified; the exterior of our Crag shell is smooth and glossy in specimens the surface of which has not been at all eroded, and it was, in a recent condition, most probably covered with an epidermis. On the anterior dorsal margin there is a rather narrow row of prominent angular teeth, varying from 20 to 35; while on the short or posterior side the teeth are broader and closer, and in number about 10 or 12, with a deeply impressed lunule on the posterior or shorter side. There is no other exterior marking than the lines of growth, but when the glossy surface is removed, the shell appears to have a radiated fibrous structure, and the interior is often faintly rayed; a long subangular depression for the ligament curves inwardly towards the anterior, adhering to the inner edge of the dorsal margin. The dorsal as well as the ventral margins are rounded, giving an ovate form to the shell, only truncated on the posterior side, where the ventral margin forms a sort of incipient rostrum, connecting it in that character with the following genus, though less so than in some other species.

2. NUCULA COBBOLDIÆ, *J. Sowerby*. Tab. X, fig. 9, *a—b*.

NUCULA COBBOLDIÆ. *J. Sow.* Min. Conch. t. 180, fig. 2, 1818.
— — *Woodward.* Geol. of Norf., p. 44, 1833.
— — *Lyell.* Mag. Nat. Hist., New Series, vol. iii, p. 328, 1839.
— — *Id.* Elem. Geol., p. 299, fig. 113, 2d. ed., 1841.
— — *S. Wood.* Mag. Nat. Hist., New Series, vol. iv, p. 295, 1840.
— — *Id.* Catalogue, 1840.
— — *G. B. Sowerby.* Genera, No. 17, fig. 9.
— — *Forbes.* Geol. Surv. Gr. Brit., p. 83, 1846.
— — *Morris.* Cat. Brit. Foss., p. 94, 1843.

Spec. Char. Testá transversá, obliquè-ovatá, convexá, clausá; irregulariter radiatá, aut lineolis flexuosis ornatá; intus sæpè incrassatá; margine integerrimo.

Shell transverse, obliquely ovate, convex, thick and closed; sculpture on the exterior, with irregular radiations or lines in a divaricating or zig-zag direction; interior often irregularly thickened, margin smooth.

Longitudinal diameter, $1\frac{1}{8}$ inch. *Height*, 1 inch.

Locality. Red Crag, Sutton, Bawdsey, near Ipswich, and Felixstow.
Mam. Crag, Thorpe, Bramerton, Chillesford, Bridlington.

This species has not, as yet, I believe, been found in any Formation older than the Red Crag, in which it does not seem to have been very abundant, but in the Deposits of the succeeding period it may be obtained in large numbers, in the portion of that Formation resting upon the Red Crag at Chillesford, where the valves are sometimes found united, and in their natural position.

There is no species known with which this is likely to be confounded, as its peculiar sculpture differs from that of any recent *Nuculæ* inhabiting the Northern Hemisphere, or of any of our well-known Tertiary species. Two fossils found in the Cretaceous Formations (*N. bivirgata* and *ornatissima*), possess similar ornament, and a recent species has been also obtained from a considerable depth off the Cape of Good Hope, which is covered with zig-zag striæ, these however have no specific relationship with our shell.

This species, although one of the finest belonging to the genus, has not attained quite so great a magnitude as the preceding one, my largest specimen does not exceed one inch and an eighth in its transverse or largest diameter, while the other has reached to an inch and three eighths. Like most of the shells from the Crag, it varies somewhat considerably in its proportional dimensions. In those which are most tumid, the diameter is less from the dorsal to the ventral margin, than it is in those which are more compressed. The number of teeth are generally from sixteen to eighteen on the anterior side, with about ten upon the shorter or posterior slope, they are prominent and sharp, of an angular form, and interlocking, and the fossette for the ligament is large, projecting inwardly, inclining beneath the dorsal edge towards the anterior side, and the umbo is terminal, and somewhat pointed. This species is sometimes much thickened internally in aged specimens, forming deeply indented impressions by the adductors, which are of a sub-circular form inclining to oval, and the marginal impression of the mantle is then ornamented with radiations like those in some of the *Lucinæ*, but the margin of the shell is smooth, and free from crenulations.

This pretty shell is ornamented upon the exterior with irregularly divaricating striæ, which generally, in the young state, have only one series of diverging lines, but in the centre part of the older specimens they are more irregular, and become zig-zag, with two, three, or more angular points of divergence, the radiations are large and rounded, and crossed by transverse or very perceptible lines of growth, and the shell when living was probably covered by an epidermis.

In some specimens the umbo is much eroded, while in others it is quite perfect.

3. **Nucula tenuis**, *Montague*. Tab. X, fig. 5, *a—b*.

Arca tenuis. *Mont*. Test. Brit. Suppl., p. 56, t. 29, fig. 1, 1808.
— — *Pennant*. Brit. Zool., vol. iv, p. 218, fide *Gould*.
— — *Dillw*. Desc. Cat. Rec. Shells, p. 246, 1817.
— — *Turt*. Conch. Dict., p. 11, 1819.
— — *W. Wood*. Ind. Test., Arca, p. 47, pl. 10, fig. 45, 1825.
Nucula tenuis. *Turt*. Brit. Biv., p. 177, 1822.
— — *Flem*. Brit. Ann., p. 402, 1828.
— — *Brown*. Illust. Conch. Gr. Brit., pl. 25, fig. 13, 1827.
— — *Gould*. Inv. Massach., p. 105, fig. 64, 1840.
— — *Möller*. Ind. Moll. Groën., p. 17, 1842.
— — *Mac Gill*. Moll. Aberd., p. 244, 1843.
— — *Morris*. Cat. Brit. Foss., p. 95, 1843.
— — *Thorpe*. Brit. Mar. Conch., p. 105, 1844.
— — *Forbes*. Geol. Surv., vol. i, p. 83, 1842.
— — *Hanley*. Rec. Shells, vol. 1, p. 171, pl. 10, fig. 45.
— — *Alder*. Cat. Moll. North. and Durh., p. 79, 1847.
— — *Lovén*. Ind. Moll. Scand., p. 34, 1846.
— — *Forb*. and *Hanl*. Hist. Brit. Moll., vol. ii, p. 223, pl. 47, fig. 6 (Animal), pl. P, fig. 5, 1849.
— tenera. *S. Wood*. Mag. Nat. Hist., New Series, vol. iv, p. 295, pl. 14, fig. 2.
— Ryckholtiana? *Nyst*. Coq. Foss. de Belg., p. 233, pl. 15, fig. 10, *a—b*, 1844.
— decipiens. *Phil*. En. Moll. Sic., vol. ii, p. 48, t. xv, fig. 15, 1844.
— lucida. *Blanding*. MSS. fide *Gould*.

Spec. Char. Testâ ovatâ, trigono-ellipticâ, lævigatâ, tenui, latere antico subangulato; lunulâ parum distinctâ, margine ventrali arcuato, integro.

Shell ovate, elliptically triangular, smooth, and thin; anterior side produced, roundedly angular; lunule not well defined, ventral margin smooth.

Diameter, $\frac{1}{2}$ an inch.

Locality. Cor. Crag? Gedgrave.
Red Crag, Bawdsey.
Mam. Crag, Bridlington, Chillesford.
Recent, Mediterranean, Britain, Scandinavia, and North America.

Two specimens of a species resembling this are in my Cabinet, they were obtained from the Coralline Crag, but are too imperfect for correct determination. In the Red Crag Formation it has undoubtedly made its appearance, several individuals were found by myself, and in the sandy deposit at Chillesford it is an abundant shell seemingly increasing in numbers towards the present Period. Its greater tenuity and more ovate form will distinguish this from *N. nucleus,* as well as the absence from the margin of all crenulations. It differs from the young of *N. lævigata* in being less transverse, that species having a greater diameter when measured from the anterior to the posterior margin, the hinge line also forms a greater angle than in *tenuis,* and the posterior termination is somewhat produced. In this species the anterior dorsal margin is more rounded than in any of the others, so is the ventral margin, giving a more ovate form to the outline. It has a rather narrow row of denticles on both sides, those upon the anterior are from ten to twelve in number, with about six or eight upon the shorter or posterior side. A shell somewhat resembling this is found in the Upper Marine, in Headon Hill, being free from crenulations at the margin, and is also a thin shell, with a similar ovate contour, though seemingly rather more pointed at the posterior extremity, but my specimens of the Eocene fossil are scarcely in a sufficiently good state of preservation for a fair comparison.

A specimen of this species, found at Bridlington, was obligingly forwarded to me for examination by Mr. Leckenby.

4. Nucula nucleus, *Linnæus*. Tab. X, fig. 6, *a—b*.

Arca nucleus. *Linn.* Syst. Nat., ed. 12, No. 184, p. 1143, 1767, not *Brander.*
— — *Chem.* Conch. Cab., t. vii, p. 241, t. 58, fig. 574, 1784.
— — *Don.* Brit. Shells, vol. ii, pl. 63, 1801.
— — *Broc.* Conch. Foss. Subap., vol. ii, p. 480, 1814.
— — *W. Wood.* Ind. Test., p. 47, pl. 10, fig. 42, 1825.
Nucula nucleus. *Turt.* Brit. Biv., p. 176, t. 13, fig. 4, 1822.
— — *S. Wood.* Mag. Nat. Hist., New Series, vol. iv, p. 294, pl. 14, fig. 1, 1840.
— — *Thorpe.* Brit. Mar. Conch., p. 105, p. 74, 1844.
— — *Lovén.* Ind. Moll. Scand., p. 34, 1846.
— — *Forb.* and *Hanl.* Hist. of Brit. Moll., vol. ii, p. 215, pl. 47, figs. 7, 8, 1849.
— margaritacea. *Lam.* Syst. des An. s. Vert., p. 115, 1801 (mostly).
— — *G. B. Sowerby.* Genera, No. 17, fig. 7.
— — *De Blainv.* Malac., pl. 75, fig. 5, 1825.
— — ? *Bast.* Mem. de la Soc. d'Hist. Nat., t. 2, p. 78, No. 2, 1825.
— — *Payr.* Cat. Moll. Cors. p. 64, 1826.
— — *Brown.* Illust. Conch. Gr. Brit., pl. 25, fig. 12, 1827.
— — *Dubois.* Conch. Foss. Wolhyn. Podol., p. 66, t. 7, figs. 35, 36, 1831.
— — *Goldf.* Pet. Germ., vol. ii, p. 158, t. 125, fig. 21, *a—d.*
— — *Phil.* En. Moll. Sic., vol. i, p. 64, t. v, fig. 8, 1836.
— — *Bronn.* Leth. Geol., vol. ii, p. 929, t. 39, fig. 5, *a—c*, 1838.
— — *Swains.* Malac., p. 382, fig. 125, *f—g*, 1840.
— — *G. B. Sow., Jr.* Conch. Man., fig. 137, 1842.
— — *Forbes.* Report on Ægean Invert., p. 180, 1843.
— — *Sism.* Syn. Meth. An. Inv. Piedm. Foss., p. 15, 1847.
— argentea? *Brown.* Illust. Conch. Gr. Brit., pl. 25, figs. 14, 15, 1827.
Glycimeris argentea. *Da Costa.* Brit. Conch., p. 170, pl. 15, fig. 6, 1778.
Donax argentea. *Gmel.* Syst. Nat., p. 3265, 1788.
Ency. Meth., pl. 311, fig. 3, *a—b.*

Spec. Char. *Testâ obliquâ, ovatâ, transversâ, subtriangulari, lævi, aut obsoletè striatâ; dentibus cardinalibus acutis; margine crenulato.*

Shell obliquely ovate, transverse, slightly triangular, smooth or obsoletely striated; hinge with numerous, sharp, and erect teeth; margin crenulated.

Diameter, $\frac{5}{8}$ths of an inch.

Locality. Cor. Crag, Sutton, Ramsholt, Sudbourn, Gedgrave.
Red Crag, Sutton, Bawdsey.
Recent, Mediterranean, Britain, and Scandinavian Seas.

Specimens of this species may be plentifully obtained in the lower or Coralline Crag Deposit, especially at Gedgrave, where it appears to have been abundant, and the numerous prominent and interlocking teeth being favorable for the preservation of the valves in their natural position, they are frequently found united.

Considerable variation may be observed in comparing numerous individuals, some of which closely approach what is called a species in the recent state under the name of *nitida*, these differences consist principally in the proportionate dimensions, the posterior side occasionally projecting more in some specimens than in others, and in a greater solidity of shell. Faint traces of radiating striæ ornament the exterior, they are most visible near the margin, these lines are also visible within; the number of crenulations slightly vary, being smaller and closer of course in the younger shell, and in this state the contour is generally more rounded, the posterior side in particular being less truncate.

A species somewhat closely allied to this is found in the upper part of the Older Tertiary Formations at Hordwell, and in the Isle of Wight, but it is probably distinct. It is thinner, the hinge line narrower and more regular, with fewer teeth, while in *N. nucleus* it is much broader as it approaches the anterior side, and the posterior margin is rather less rounded.

A shell from the Upper Tertiaries of the United States strongly resembles this species, and may, when better known, prove to be an identity.

5. Nucula trigonula, *S. Wood.* Tab. X, fig. 7, *a—b.*

Nucula trigonula. *S. Wood.* Illust. Mag. Nat. Hist., vol. iv, New Series, p. 295, pl. 14, fig. 3.
— — *S. Wood.* Catalogue, 1840.
— — *Morris.* Cat. Brit. Foss., p. 95, 1843.

Spec. Char. Testâ minutâ, trigonulâ, lævigatâ, tumidâ, margaritaceâ; anticè subangulatâ, posticè abbreviatâ, margine ventrali crenulato.

Shell small, trigonular, smooth, tumid, nacreous, anterior side roundedly angular, posterior side very short, ventral margin crenulated.

Longitudinal diameter, $\frac{3}{8}$ths. *Height*, $\frac{1}{4}$ of an inch.

Locality. Cor. Crag, Sutton.

About a dozen specimens with a much more angular or trigonal form than is presented by the normal character of *N. nucleus*, are in my cabinet from the Cor. Crag, which induced me, when publishing the Crag species of this family, to consider them as belonging to a distinct species, and I am still inclined to retain them as such, from a very marked difference in the outline; it is nevertheless possible they may be nothing more than specific variations, the result of some local condition; they possess, however, sufficient difference to remain as specimens of a distinct variety, should they be hereafter degraded from their isolated position. I have seen this species from the Coralline Crag only, where *N. nucleus* is found in abundance, and of all sizes, but none of which seem to form any very close connection with this shell. British Conchologists retain as distinct in this genus forms with less variation of character than what is exhibited in our fossil specimens.

Nucula nitida, Sow., appears to offer less pretensions for specific distinction, than are presented by the angulated outline of our fossil, but probably the whole three will merge into one species.

Nucula proxima of American authors, according to figures and descriptions, much resembles our fossil, and is probably only another specific variation of a shell with a very extended range.

Nucula radiata, Hanley, differs nothing in form from some of our Crag specimens, and if it be a distinct species, may also have been in existence during that early period.

LEDA,[*] *Schumacher.* 1817.

NUCULA (sp.). *Lam.*, 1801.
ARCA (sp.). *Mont.*, 1803.
LEMBULUS. *Leach,* MS. 1819.
LEMBULA (sp.). *Risso,* 1826.
DACROMYA. *Agass.*, 1839.
YOLDIA. *Möller,* 1842. *Lovén,* 1846.
LEDA. *Lovén,* 1846.
MOLDIA. *Gray,* 1847 (misprint).

Generic Character. Shell equivalve, inequilateral, elliptical or fig-shaped, posteriorly more or less angulated or acuminated; smooth or transversely striated, covered by an epidermis in the recent state; umbones small, approximate. Hinge furnished with numerous teeth arranged in a linear series, curved or slightly angular, interrupted in the centre, or immediately beneath the beaks by a triangular fossette for the reception of the ligament; impressions by the muscles ovate or subangular, that by the mantle more or less sinuated.

Animal transversely ovate, mantle open in front with simple, sometimes fimbriated, margins; foot large and discoidal, with serrated edges; posterior side of the mantle prolonged into two, partially united, slender and unequal siphonal tubes.

The genus *Nucula,* as established by Lamarck, was intended to contain all those shells which had a hinge furnished with a line of sharp prominent teeth, separated at the umbo by an angular depression for the reception of the ligament, and placed within the margin of the shell, many of these have the posterior portion, as it were, cut off or wanting, in which the animal is entirely without the protruding siphonal tubes, and the impression of the mantle is therefore entire, this section constitutes our genus *Nucula*, the type of which is *Arca nucleus*, Linn. Many species formerly included have a prolonged posterior side, making the shell sometimes nearly equilateral, and the animal is then furnished with elongated siphonal tubes. This was originally proposed by Schumacher, under the name of *Leda*, without his being at all aware of the essential difference, as the only reason assigned for the division was that these shells were more nearly related to *Pectunculus* (Essai d'un Nouv. Syst. des Vers. Test. p. 173).

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[*] Etym., a proper name.

Möller divided these latter or bilateral Nuculæ into two genera, without, however, any apparent distinction, either in the shell or animal; *Nucula arctica*, the species he intended as the type of his genus *Yoldia*, being furnished with a sinuated impression like that of *N. minuta* (the typical form of *Leda*), indicating the possession of protruding siphons in the animal of that species; neither does the form of the exterior present any essential difference.

These resemblances were more especially pointed out by Professor E. Forbes, in his valuable essay in the first vol. of the 'Memoirs of the Geological Survey,' p. 418, where the two genera are united.

Shells possessing the form and characters assigned to this genus are found in some of our oldest formations, and are continued through the more modern Periods.

1. LEDA LANCEOLATA, *J. Sowerby*. Tab. X, fig. 16, *a—b*.

NUCULA LANCEOLATA. *J. Sow.* Min. Conch., t. 180, fig. 1, 1817.
— — *Morris.* Cat. of Brit. Foss., p. 94, 1843.
— OBLONGA. *G. B. Sowerby.* Genera, No. 17, fig. 6.
— — *Woodward.* Syn. Tab. Brit. Org. Rem., p. 15, 1830.
— — *S. Wood.* Mag. Nat. Hist., New Series, vol. iv, p. 296, 1840.
— ARCTICA. *Brod.* and *Sow.* Zool. Journ., No. xv, p. 359. t. ix, fig. 1, 1829.
— — *Middendorff.* Mem. de l'Acad. Imp. de St. Petersb. p. 544, 1849.
YOLDIA ARTICA. *Möller.* Ind. Moll. Groen., p. 18, 1842.

Spec. Char. Testá transversá, elongato-ovatá, inæquilaterá, crassá; anticè majiore et latiore elliptico-rotundatá, posticè subrostratá; externè striatá, striis transversis obliquis, dentibus crassis angulatis.

Shell transverse elongato-ovate, inequilateral, thick and strong, anterior side the larger and broader, elliptically rounded; posterior subrostrated; externally striated, striæ broad and oblique, teeth thick and angulated.

Longitudinal diameter, 2¼ inches.

Locality. Red Crag, Bawdsey.
Mam. Crag, Chillesford. Recent, Arctic Seas.

This species in the recent state appears to be restricted to colder regions of the northern hemisphere, and is essentially a Boreal species. In the Red Crag it is by no means abundant, and until the discovery of the native bed at Chillesford, resting upon the Red Crag, it was considered a shell of great rarity in our cabinets, but at this latter locality it may now be obtained in considerable numbers, and the specimens have there seemingly reached their full development in regard to size, some of mine having a magnitude of two inches and a quarter in the longest diameter. This and *Mya truncata* are the most characteristic as well as the most abundant species in that Deposit. The anterior side of the shell may be described as forming nearly half a regular ellipsis, and the posterior side is smaller and rostrated; the pointed termination curving a little upwards; a large lanceolated corselet or flattened space occupies nearly the whole length of the posterior slope, and a smaller or more narrow one is generally to be seen at the dorsal margin on the anterior side; the number of teeth are variable, generally about twenty on the posterior, and thirty on the anterior side, they are large, prominent, sharp, and angular, with serrated edges, the lateral teeth are more distant from each other than those nearer the umbo; this is the number in the adult shell; in the younger state they are less numerous, additions being made to their amount as the animal enlarges; a sinus with two or three obsolete rays curves over the anterior side at some little distance from the dorsal margin, produced probably by the protrusion of a peculiarly formed foot at that part of the edge of the shell; coarse lines of growth cover the exterior, and these are cut at a small angle by ridges which cross the shell in an oblique direction from the anterior to the posterior ventral margin; but not extending over the dorsal portion of the shell on either side: in some aged specimens, the interior is irregularly and ruggedly thickened, leaving deep impressions on those parts to which the muscles of the animal were attached: that of the adductor on the anterior side is large and angularly ovate, and not far from the extremity, the posterior one is smaller, and situated more within the shell; the curve formed by the retrocession of the siphonal tubes is rather variable, extending in some specimens as far as the middle of the ligamental area. The principal variation to which this species appears to be subject is merely in the proportional dimensions.

The name proposed by Mr. J. Sowerby has priority of date over that employed by Lamarck for a very different species, which was published in 1819, and as such it is retained here for the Crag Fossil; and for the shell, therefore, so called by Lamarck, I would substitute that of *cultrata*.

2. Leda myalis, *Couthouy.* Tab. X, fig. 17, *a—c.*

Nucula myalis. *Couth.* Bost. Journ. Nat. Hist., vol. ii, p. 62, pl. 3, fig. 7, 1839.
— — *Gould.* Invert. of Massach., p. 99, 1841.
— — *Dekay.* Hist. New York Zool., p. 180, pl. 13, fig. 219, 1843.
— oblonga ? *Woodward.* Geol. of Norf., p. 44, 1833.
— allied to oblonga. *Lyell.* Mag. Nat. Hist., New Series, p. 328, 1839.
— oblongoïdes. *S. Wood.* Mag. Nat. Hist., New Series, vol. iv, p. 297, pl. 14, fig. 4, 1840.
— — *Morris.* Cat. Brit. Foss., p. 95, 1843.
— — *Forbes.* Mem. Geol. Surv., vol. i, p. 420, 1846.
— hyperborea. *Lovén,* sec. *Gould.*
Yoldia angularis. *Möller.* Ind. Moll. Gröenl., p. 19, 1842.

Spec. Char. Testâ transversâ, inæquilaterâ, elongato-ovatâ, tenui; anticè elliptico-rotundatâ, posticè subrostratâ; lævigatâ; dentibus mediocriter angulatis.

Shell transverse, inequilateral, elongato-ovate, thin, and externally smooth; anterior side roundly elliptical, posterior subrostrated; externally smooth; teeth moderately angulated.

Longitudinal diameter, $1\frac{3}{4}$ inch. *Height,* 1 inch.

Locality. Red Crag, Sutton and Butley.
Mam. Crag, Chillesford and Bramerton. Recent, North America.

This species, like the preceding one, appears in the recent state to be confined to the colder regions of the globe, and as a fossil has been found only in the newer Tertiaries in this country. In the Red Crag I have met with but very few specimens, while at Chillesford it may be obtained in abundance, and is by no means scarce, I believe, in the Estuary portion of the Mammaliferous Crag at Bramerton. It is readily distinguished from *L. lanceolata,* in being more equilateral, the posterior portion is comparatively larger, and it wants the peculiar diagonal ridges which ornament the surface of that shell; nor does it appear even to attain to such dimensions, my largest specimen being under two inches in its transverse or longest diameter, neither is it ever so thick a shell. A specimen obtained in the Red Crag at Sutton is more elongated or attenuated than those usually found at Chillesford, and it approaches in that character *L. limatula* of the American Seas (fig. 17, *c*); but that species is rather more elegantly formed, and more rostrated, with a greater curvature at the posterior termination. Our shell is covered with concentric striæ or lines of growth, but not in regular ridges, and there is not so distinct a sinus on the anterior side, as in *L. lanceolata,* although in some specimens a radiating line traverses that side of the shell from the umbo, which line is produced by a slight interruption to the regular curve of the margin: a large corselet is well defined on the posterior side, and the ligamental pit is comparatively larger than in *L. limatula.* The shell is sometimes thickened in the interior, though never so much so as in *L. lanceolata*, and the muscular marks are then deeply impressed, those produced by the adductors are of a subovate form, and are unequal in size, the anterior one being the larger, and the sinus formed by the mantle extends about as far inwardly as the posterior part of the ligamental pit, which is broad and contracted in the centre.

Our shell appears to correspond with the recent American species to which it is here assigned, in all its characters, excepting size. Dr. Gould gives the dimensions of his shell as $1\frac{1}{10}$ inch in its largest diameter, which is considerably less than the magnitude to which our fossil has attained. In the recent state it is generally eroded at the beaks; our fossil does not appear to have been at all acted upon at that part, it is there quite perfect.

A shell from the Antarctic Seas, *N. Eightsii, Couthouy*, strongly resembles our British fossil.

3. **Leda semistriata**, *S. Wood.* Tab. X, fig. 10, *a—b.*

Nucula semistriata. *S. Wood.* Mag. Nat. Hist., New Series, vol. iv, p. 297, pl. 14, fig. 5, 1840.
— nitida. *Nyst.* Rech. Coq. Foss. d'Anv., p. 16, pl. 3, fig. 62, 1835, (not *Brocchi.*)
— depressa. *Nyst.* Coq. Foss. de Belg., p. 220, pl. 15, fig. 7, 1844.

Spec. Char. Testâ transversâ, ovato-ellipticâ, subæquilaterâ, compressâ, tenuissimi, fragili; anticè rotundato-ovatâ et lævigatâ, posticè subrostratâ et transversim striatâ; natibus approximatis, margine integerrimo.

Shell transverse, elliptically ovate, subequilateral, compressed, thin, and fragile; anterior side roundly ovate and smooth; posterior subrostrated and transversely striated; beaks approximate, margin quite smooth.

Longest diameter, 1 inch.

Locality. Cor. Crag, Sutton and Ramsholt.

This shell is abundant in the Coralline Crag at Sutton, but from its great fragility specimens of the above dimensions are very rarely obtained, and if it be the same as the Belgian fossil, which I presume is the case, M. Nyst speaks of it as being by no means rare in the Campinian Beds.

The striæ or transverse ridges upon our shell are rounded and obtuse, not sharp or imbricated; they cover the posterior half of the exterior, extending from a little beyond the centre or umbo to the extremity, but often become irregular and obsolete upon the posterior slope, and the shell is there depressed and subsinuated with a very slightly recurved and somewhat pointed termination at the extremity of the dorsal edge. From the extreme thinness of the shell the transverse edges are often visible in the interior; a long line of sharp angularly formed and prominent teeth occupy the hinge area, amounting in large specimens to as many as five and twenty on the anterior, with twenty or more on the opposite side, while in young ones they are not above half that number: they are separated by a rather large and obtusely angular ligamental pit, somewhat contracted in the middle; a large lanceolate-formed and well defined lunule and corslet may be seen on both sides of the umbo, but the muscle marks within are very slightly impressed and are indistinct, with doubtful traces of a deeply sinuated form in the one by the mantle.

I am not at all acquainted with the range of this species; but it does not appear to have a specific relationship with *Nucula lævis,* Say, with which M. Nyst has considered his shell identical, and to which he would also unite *N. limatula,* a very different species. It resembles in outline *N. sapotilla,* Gould, but seems to differ specifically from it in the conspicuous transverse ridges, as well as in having a greater number of teeth, depending upon the figure and description of that very accurate observer, Dr. Gould, who would undoubtedly have pointed out the exterior ornament had it possessed any.

4. Leda caudata, *Donovan.* Tab. X, fig. 12, *a—b.*

Arca caudata. *Don.* Brit. Shells, vol. iii, pl. 78, 1802.
— minuta. *Mont.* Test. Brit., p. 140, 1803, not *Broc.*
— — *Turt.* Conch. Dict., p. 11, fig. 98, 1819.
— — *W. Wood.* Ind. Test., p. 47, pl. 10, fig. 44, 1828.
Nucula minuta. *Turt.* Brit. Biv., p. 178, 1822.
— — *Brown.* Illust. Conch. Gr. Brit., pl. 25, fig. 18, 1827.
— — *S. Wood.* Mag. Nat. Hist., New Series, vol. iv, p. 298, pl. 14, fig. 6, 1840.
— — *Gould.* Invert. Massach., p. 101, 1841.
— rostrata. *G. Sowerby.* Genera No. 17, fig. 5.
— — *Mac Gill.* Moll. Aberd., p. 245, 1843.
Leda minuta. *Möller.* Ind. Moll. Groenl., p. 17, 1842.
— — *King.* Ann. Nat. Hist., vol. xviii, p. 240.
— — *Forbes.* Mem. Geol. Surv., vol. i, p. 419, 1846.
— caudata. *Lovén.* Ind. Moll. Scand., p. 34, 1846.
— — *Alder.* Cat. Moll. North. and Durh., p. 79, 1848.
— — *Forb.* and *Hanl.* Hist. Brit. Moll., vol. ii, p. 226, pl. 47, figs. 12, 13, and pl. P, fig. 2, 1849.

Spec. Char. *Testá transversá, elongato-ovatá, vel ficiformi, convexiusculá, tenui; concentricè striatá, anticè breviori, rotundatá; posticè longiori attenuatá, angulatá, et subrostratá, margine integro.*

Shell transverse, elongato-ovate or fig-shaped, slightly convex, thin; covered with transverse or concentric striæ; anterior side the shorter, rounded, posterior attenuated, angulated, and subrostrated, margin smooth.

Longitudinal diameter, ½ an inch nearly.

Locality. Red Crag, Sutton.
Mam. Crag, Bridlington.
Clyde Beds. Recent, Britain, Scandinavian Seas, and North America.

I have seen but one specimen of this species from the Red Crag, which was found by myself nearly twenty years since, and I presume it, therefore, to be rare in that Deposit; one specimen also from the Cabinet of Mr. Leckenby, found at Bridlington, appears to belong to the same species, and they are both assigned to the recent British one, and to the more ventricose or less transverse variety: specimens of the recent shell, corresponding in every respect with our Crag fossil, have been obtained by myself on the shore at low water on the Coast of Suffolk, and I have no hesitation in pronouncing upon their identity.

5. LEDA PERNULA, *Müller*. Tab. X. fig. 13, *a—c*.

ARCA PERNULA. *Müll.* Besch. Berl. Naturf. Fr., iv, 57, 1779, fide *Lovén*.
— MARTINI. *Chem.* Conch. Cab., t. vii, t. 206, fig. 550, 1784.
— ROSTRATA. *Gmel.*, fide *Lovén*.
— — *W. Wood.* Ind. Test., p. 47, pl. 10, fig. 43, 1825.
— FLUVIATILIS. *Schröt.* Flusc., p. 187, pl. 9, fig. 2, fide *Desh.*
NUCULA FLUVIATILIS. *G. Sowerby*, Genera No. 17, fig. 3.
— OBLONGA. *Brown.* Illust. Conch. Gr. Brit., pl. 25, fig. 17, 1827.
— ROSTRATA. *G. Sowerby.* Conch. Illust., fig. 12.
— — *Desh.* 2d ed. Lam., t. vi, p. 504, 1835.
— JACKSONI? *Gould.* Inv. Massach., p. 102, fig. 65, 1841.
— — *Dekay.* Nat. Hist. New York Zool., p. 181, pl. 12, fig. 213, 1843.
— TENUISULCATA. *Couth.* Bost. Journ. Nat. Hist., vol. ii, p. 64, pl. 3, fig. 8, 1839.
LEDA ROSTRATA. *Forbes.* Mem. Geol. Surv., p. 420, 1846.
— — *Schum.* Essai, &c., p. 173, pl. 19, fig. 4, *a—b*, 1817.
— PERNULA. *Lovén.* Ind. Moll. Scand., p. 34, 1846.

Spec. Char. Testâ transversâ elongatâ, anticè rotundatâ, posticè duplo longiori, in rostrum obtusum attenuatâ, concentricè striatâ.

Shell transverse, elongate, anterior side rounded, posterior twice the length and attenuated, terminating in an obtuse beak, concentrically striated.

Longest diameter, $\frac{7}{8}$ths of an inch.

Locality. Mam. Crag, Bridlington.
Clyde Beds.

One specimen (fig. 13, *c*) belonging to Mr. Bean, found at Bridlington, and obligingly lent to me by that gentleman for the purpose of description, appears to be somewhat different from the preceding, it corresponds with the recent form found in the Boreal Seas of Europe, and which is most probably also a native of the Northern Coast of America. Our fossil is not in good condition, being compressed and slightly broken, and its natural form in consequence somewhat distorted, but it is sufficiently perfect to permit of a presumed evidence of identity with the recent species. It is more inequilateral than the preceding species, larger, and with finer concentric striæ, corresponding with the figure and description of *N. tenuisulcata*, Couthouy, and of which, probably, *N. Jacksoni*, Gould, is only a variety. Fig. 13, *a*, *b*, is the representation of a specimen from the Clyde Beds, given to me by Jas. Smith, Esq., of

Jordan Hall; all the specimens I have seen from these Deposits are small, scarcely exceeding half an inch in length, while the one from Bridlington has nearly twice that diameter.

This appears to differ but very slightly from the more elongated variety of *L. caudata,* considered a different species by our British Conchologists, as well as by Dr. Lovén, the principal difference is in the striæ, which in this shell is finer or more numerous.

6. LEDA TRUNCATA, *Brown.* Tab. X, fig. 14, *a—b.*

NUCULA TRUNCATA. *Brown.* Illust. Conch. Gr. Brit., pl. 25, fig. 19, 1827.
— — *Smith.* Mem. Wern. Soc., vol. viii, p. 42, 1838.

Spec. Char. *Testâ transversâ, ovatâ; concentricè striatâ, tumidâ, subæquilaterâ; anticè rotundatâ, posticè truncatâ vel subsinuatâ; umbonibus prominulis; margine integerrimo.*

Shell transverse, ovate, subequilateral, tumid, concentrically striated; anterior side rounded, posterior truncate or subsinuated; umbones slightly prominent; margin smooth.

Length, $\frac{7}{8}$ths of an inch nearly. *Height,* $\frac{1}{2}$ an inch.

Locality. ——— ?

This shell has been rejected by the authors of the 'Hist. of British Mollusca' as an existing British species, and although not found in any of our Crag Deposits, belongs undoubtedly to the Upper Tertiaries of England. It is an animal still living in the Arctic Seas, but is no longer an inhabitant of our own.

The specimen figured was obtained by Robert M'Andrew, Esq., who has obligingly permitted me the use of it for the purpose of description: it was, he says, in company with other, supposed extinct, species as *Pecten Islandicus,* &c., and dredged from the depth of 40 to 60 fathoms, off the North Western Coast of the Isle of Skye. It is ornamented with close-set striæ, that appear independent of lines of growth, as they occasionally bifurcate, and are not, therefore, quite parallel to the margin; its most peculiar character is on the posterior side, where there is a somewhat angular ridge or keel from the umbo to the projecting beak-like termination, forming above a large and elongate lunule-like space between it and the margin of the shell; below is another obtuse ridge extending from the umbo to the posterior part of the ventral margin, and between this and the pointed termination, the shell is flattened or slightly contracted at the margin, from which it is presumed it received its name: the shell is tumid, the umbones somewhat curving over, so that the ligamental area projects inwards; there are from 12 to 18 teeth on each side, while the sinus in the mantle is not very deep: the specimen is a full grown or aged individual, as the interior is irregularly thickened, and more especially rugose between the margin of the shell and the line of attachment by the mantle.

7. **Leda pygmæa**, *Münster.* Tab. X, fig. 11, *a—b.*

Nucula pygmæa. *Munst.* Apud. Goldf. Pet. Germ., vol. ii, p. 157, t. 125, fig. 17.
— — *S. Wood.* Mag. Nat. Hist., New Series, vol. iv, p. 298, pl. 14, fig. 7, 1840.
— — *Phil.* En. Moll. Sic., vol. ii, p. 46, 1844.
— — *Middendorff.* Mem. de l'Acad. Imp. de St. Petersb., p. 544, 1849.
— gibbosa. *Smith.* Mem. Wern. Soc., vol. viii, pl. 2, fig. 10, 1838.
— corbuloides. *Id.* in *addendum.*
— tenuis. *Phil.* En. Moll. Sic., vol. i, p. 65, pl. 5, fig. 9, 1836.
— — *Jeffreys.* Ann. Nat. Hist., vol. xix, p. 313.
— lenticula. *Möll.* Ind. Moll. Groenl., p. 17, 1842.
— Philippiana. *Nyst.* Coq. Foss. de Belg., p. 224, pl. 17, fig. 5, *a—c,* 1844.
Leda pygmæa. *Forbes.* Mem. Geol. Surv., vol. i, p. 419, 1846.
— — *Forb.* and *Hanl.* Hist. Brit. Moll., vol. ii, p. 230, pl. 47, fig. 10, and pl. P, fig. 3, 1849.
Yoldia pygmæa. *Lovén.* Ind. Moll. Scand., p. 35, 1846.

Spec. Char. Testâ minutâ, ovato-trigonulâ, subæquilaterâ; tumidâ, lævigatâ, politâ, clausâ; anticè ovato-rotundatâ, posticè subrostratâ; lunulâ indistinctâ; margine integerrimo.

Shell small, triangularly ovate, subequilateral, gibbous, smooth, glossy, and closed; anterior side roundedly ovate; posterior subrostrated, without a distinct lunule; margin very smooth.

Longitudinal diameter, $\frac{1}{6}$th of an inch.

Locality. Cor. Crag, Sutton, Ramsholt, Gedgrave.
Clyde Beds. Recent, Mediterranean? Britain, Scandinavia.

This species is found in several localities of the Coralline Crag, and very abundantly at Sutton. It may be further described as having a very broad hinge line furnished with 8 to 12 teeth on each side of the umbo, they are angular, large, and prominent in the centre of the area and towards the sides, with large interspaces for the interlocking of the teeth of the opposite valve, by which the two valves are often found in conjunction. The shell is very tumid, moderately thick and strong, and perfectly closed all round, it has a somewhat prominent umbo, and is without any defined lunule or corselet; the posterior side is generally though not always the larger, and its termination rather acuminated and a little curved upwards: the fossette for the ligament is very small, and the muscle marks not in general deeply impressed or well defined; that by the mantle has a small sinus. The shell is glossy both within and without, and slightly nacreous. My Crag specimens are small, not exceeding the sixth of an inch in the transverse or greatest diameter; but a few specimens from the Clyde Beds, obligingly given to me by James Smith, Esq., of Jordan Hall, appear to have attained larger dimensions, and are rather less equilateral.

This shell is given by Philippi, on the authority of Scacchi, as a species living in the Mediterranean, and it is also found fossil in the Upper Tertiaries of that part of the world.

The living animal has recently been obtained by Mr. M'Andrew, from the depth of nearly 50 fathoms, on a muddy bottom, in the Sound of Skye; and it is quoted by Lovén as an existing species on the Coast of Finmark, while Möller gives it from the Greenland Seas.

8. LEDA THRACIÆFORMIS, *Storer*. Tab. X, fig. 15.

NUCULA THRACIÆFORMIS. *Stor.* Bost. Journ. Nat. Hist., vol. ii, p. 122, 1838.
— — *Gould.* Invert. Massach., p. 97. fig. 66, 1841.
— — *Dekay.* Nat. Hist. New York (Zoology), p. 178, pl. 12, fig. 217, *a—b*, 1843.

Spec. Char. "*Testâ ovato-oblongâ, transversâ, nigrâ, crassâ; anticè rotundatâ, posticè truncatâ et compressâ, umbonibus prominentibus; cardine foveâ magnâ.*" (Storer.)

"Shell ovato-oblong, transverse, black, and thick; anterior side rounded, posterior truncated and compressed, beaks prominent, with a large ligamental pit."

The specimen figured, was obtained by R. M'Andrew, Esq., a gentleman to whom science is so largely indebted for a more correct knowledge of our native Marine Fauna. This novelty is the result of one of his very recent explorations in the Sound of Skye, and was dredged, he tells me, at the depth of about 50 fathoms, and found in association with *Leda truncata*, *Pecten Islandica*, &c., species supposed to have become extinct in our own Seas, though still existing in some other regions of the Northern Hemisphere: the specimen (although but a fragment, is a considerable portion of the shell), was consigned to Professor E. Forbes, who is also of opinion that it is identical with *Leda Thraciæformis*, and I am much indebted to those two gentlemen for the privilege of being the first to make it known as having once been an inhabitant of our own Seas; and although it be another, to which as a describer of the Crag species I may not strictly have a claim, it belongs at least to the bygone times, and comes into the province of the Palæontologist.

What remains of the specimen seems to justify its being considered as belonging to the species to which it is here assigned, although the most characteristic portion of the shell is destroyed; I have, therefore, copied the specific character from the original describer: it differs from *L. truncata* in being somewhat thinner and more compressed, but there is scarcely enough of the shell remaining to show satisfactorily the peculiar ridge on the posterior side sloping from the umbo to the extremity of the ventral margin: it is ornamented with concentric striæ, like *L. truncata*, and they are slightly wavy in their direction.

The specimens of this species hitherto recorded as having been found in the recent state were from the stomachs of the Cod and Sand-dab, and these fishes were taken at the depth of 30 fathoms and upwards.

The outline tracing is copied from the figure of the recent shell in Dr. Gould's 'Invertebrata of Massachusets.'

Unio, *Retzius*, 1788.

Mya (sp.).	*Linn.*,	1747.
Triquetra.	*Klein*,	1753.[*]
Limnæa and Limnæoderma (sp.).	*Poli.*,	1791.
Cristaria.	*Schum.*,	1817.
Paxyodon.	*Id.*	„
Prisodon.	*Id.*	„
Margaritana.	*Id.*	„
Amblema.	*Rafinesque*,	1819.
Elliptio.	*Id.*	„
Eurynia.	*Id.*	„
Obovaria.	*Id.*	„
Plagiola.	*Id.*	„
Pleurobema.	*Id.*	„
Proptera.	*Id.*	„
Truncilla.	*Id.*	„
Aximedia.	*Id.*	1820.
Diplasma.	*Id.*	„
Ellipsaria.	*Id.*	„
Lampsilis.	*Id.*	„
Leptodea.	*Id.*	„
Metaptera.	*Id.*	„
Obliquaria.	*Id.*	„
Quadrula.	*Id.*	„
Rotundaria.	*Id.*	„
Scalenaria.	*Id.*	„
Syntoxia.	*Rafinesque*,	1820.
Alasmodonta.	*Say*,	1820.
Mysca.	*Turton*,	1822.
Diplodon.	*Spix*,	1827.
Tetraplodon.	*Id.*	„
Lasmigona?	*Rafin.*,	1831.
Lasmonos?	*Id.*	„
Monocondylæa.	*D'Orb.*,	1835.
Æglia.	*Swainson*,	1840.
Canthyria.	*Id.*	„
Calceola.	*Id.* (not *Lam.*),	1840.
Complanaria.	*Id.*	1840.
Cunicula.	*Id.*	„
Hemiodon.	*Id.*	„
Hyridella.	*Id.*	„
Iridea.	*Id.*	„
Ligumia.	*Id.*	„
Lymnadea.	*Id.*	„
Megadomus.	*Id.*	„
Naia.	*Id.*	„
Naidea.	*Id.*	„
Potamida.	*Id.*	„
Theliderma.	*Id.*	„
Uniopsis.	*Id.*	„
Luticola.	*Goldfuss*,	1846.

Generic Character. Shell equivalve, inequilateral, generally thick and externally smooth, occasionally ornamented with nodules or spines. In the recent state covered with an epidermis, often wanting at the umbones, where the shell is sometimes much eroded. Hinge, with two cardinal teeth in the left valve, and one, sometimes two, in the right, an elongated lateral tooth on the posterior side. Impressions by the adductor muscles large and deep, that by the mantle without a sinus. Ligament external. Shell nacreous.

Animal of the form of the shell, its mantle open in front, with simple edges or slightly fringed; siphonal tubes short, plain or fringed, sometimes scarcely defined; foot large, compressed.

This is pre-eminently a fresh-water genus, and although found living in the rivers of Europe, Asia, and Africa, appears to be only fully developed in the lakes and rivers of North America, more than 200 species have been named and described from that part of the world.

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[*] In compliance with the recommendation of the Committee appointed by the British Association for the Advancement of Science, 1842, "to consider the rules by which the Nomenclature of Zoology may be established on a uniform and permanent basis,"—the 12th edition of Linnæus's 'Systema Naturæ,' 1767, is made the starting point from which the dates of priority have been adopted.

The difference between this genus and that of *Anodonta* is in the absence of teeth in the latter, as the name implies; but the modification of the hinge as well as the outward form of the shell in the whole group is so exceedingly variable, some being perfectly orbicular, while others are elongated and cylindrical, as to have caused it to be divided into numerous Genera, but these divisions appear to be founded upon characters alike unstable and insignificant.

As fossil, this genus is said to date its existence from the Coal Measures; it is found in the Wealden, and in the Fresh-water Deposits of the Older as well as the Newer Tertiaries, and wherever met with, the species are seldom numerous, but the individuals are usually very abundant.

1. Unio littoralis, *Lamarck.* Tab. XI, fig. 12, *a—b.*

Unio littoralis. *Lam.* Syst. des An. sans Vert., p. 114, 1801.
— — *Id.* Hist. des An. Sans. Vert., t. vi, p. 66, 1815.
— — *Drap.* Hist. Nat. des Moll. Ter. et Fluv. de France, p. 133, No. 3, pl. 10, fig. 20, 1805.
— — *Brard.* Hist. Coq. des Env. de Par., p. 222, pl. 8, fig. 6, 1815.
— — *Pfeiffer.* Land and Sussw. Moll., p. 117, pl. 5, fig. 12, 1821.
— — *Phil.* En. Moll. Sic., vol. i, p. 66, and vol. ii, p. 48.
— — Mag. Nat. Hist., New Ser., vol. ii, p. 548, fig. 27, 1838.
— — *Lyell,* Elem. of Geol., 2d ed., vol. i, p. 62, fig. 29, 1841.
— — *G. B. Sow., Jr.* Conch. Man., fig. 145, 1842.
— — *Rossmas.* Icon. der Land and Sussw. Moll., No. xi, p. 14, t. lv, figs. 473, 744, and No. xii, p. 27, t. lvi, figs. 752—754, 1844.
— — *Dupuy.* Ess. sur les Coq. Viv. et Foss. Dep. du Gers., p. 86.
— Pianensis. *Farines.* } fide *Rössmasler.*
— subtetragonus. *Mich.*
— nana. *Desh.* 2d ed. Lam., t. vi, p. 539, No. 17, 1835.
— antiquior. *Strickland.* Silur. Syst., p. 555, 1839.
— incurvus. *Lea.* Obs. Gen. Unio, vol. i, p. 107, pl. 13, fig. 27, 1832.
— granosus. *Schum.*, fide *Lea.*
Mya rhomboidea. *Schröter.* Ausland. and Flussch., t. 2, figs. 2, 3, 1783.
Ency. Meth., pl. 248, fig. 2.

Spec. Char. Testá ovato-oblongá, crassá, valdè inæquilaterá, anticè rotundatá, posticè subquadratá, compressiusculá; umbonibus prominulis, flexuosis, undulatis; dente antico cardinis dextri crasso, triangulari.

Shell ovato-oblong, thick, very inequilateral; anterior side rounded, posterior subquadrate, slightly compressed; umbones with undulating rugosities; anterior cardinal tooth in the right valve thick and triangular.

Length, $2\frac{1}{2}$ inches. *Height,* $1\frac{3}{4}$ inch.

Locality. Cropthorn (*Strickland*), Clacton, Grays (*Morris*), Ilford (*Morris*).
Recent, France, Sicily.

Exceedingly abundant in the Fluviatile Deposit at Clacton.

It may be further described as being furnished with two cardinal teeth in the left valve, the anterior one is somewhat thin, sharp, and angular, sloping towards the muscle mark on that side, the other one on the posterior side of the umbo is thick, strong, and rugose, with a sharp, linear, lateral tooth, nearly parallel to the dorsal margin, or ligamental fulcrum: the right valve has one large cardinal tooth divided in the middle, this fits into a depression in the left valve of a corresponding form, and parallel to the margin is an elongated, sharp, and elevated, lateral tooth; the muscle marks are deeply impressed, more especially the anterior one, this is rugose and subquadrangular, and is bipartite or has a smaller one adjoining, more within the shell; the posterior one, placed at the extreme edge of the ligament, is slightly ovate, with the mantle mark parallel to the margin of the shell, connecting the adductors; the posterior is obtusely angular, and the shell on that side is somewhat compressed or less tumid than at the anterior: the surface of the shell is roughened by irregular and prominent lines of growth; on many of the individuals there are the remains of the epidermis, and in most instances the specimens have the ligament entire, with the valves in their natural position.

Several valves in my Cabinet have specimens of *Balanus* adhering to them, showing the proximity of the Sea at one time to this Deposit, or perhaps the re-occupation by salt-water of the locality once filled with fresh-water and its inhabitants.

This species has now an extensive Geographical range, being found in the North of France, and in the fresh-waters of the Island of Sicily; and Lea, in his 'Observations on the Genus Unio,' vol. i, p. 201, says "the shell found in the Euphrates, near Bagdad, is only a variety of this species," and he records it also as the opinion of the Baron de Ferussac. I have never seen this shell.

2. Unio tumidus, *Retzius.* Tab. XI, fig. 13.

Unio tumidus. *Retz.* Nova. Gen. Test., p. 17, 1788.
— — *Pfeiff.* Land und Sussw. Moll., pt. ii, p. 34, pl. 7, figs. 2, 3, and pl. 8, figs. 1, 2.
— — *Rossm.* Icon. Land und Sussw. Moll., pt. i, p. 117, pl. 8, fig. 70; pt. iii, p. 27, pl. 14, figs. 262—4; pl. 40, fig. 542; pl. 60, figs. 772—778.
— — *Gray.* Man. Land and F. W. Shells, p. 297, pl. 2, fig. 13, 1844.
— — *Forb.* and *Hanl.* Hist. Brit. Moll., vol. ii, p. 140, pl. 40, fig. 1, 1849.
Mya ovalis. *Mont.* Test. Brit., p. 34, 1803.
— depressa. *Don.* Brit. Shells, vol. iii, t. 101, 1802.
— ovata. *Don.* Brit. Shells, vol. iv, t. 122, 1803.
Mysca ovata. *Turt.* Brit. Biv., p. 246, 1822.
— — *Swains.* Malac., p. 277, fig. 56, 1840.
— solida. *Turt.* Brit. Biv., p. 246, pl. 16, fig. 2, 1822.
Unio pictorum. *Brown.* Illust. Brit. Conch., pl. 26, fig. 2, 1827.
— ovalis. *Sowerby.* Genera of Shells, No. 16, Unio, fig. 1.
— — *Brown.* Illust. Brit. Conch., 2d ed., pl. 31, figs. 1—4.
— rostrata? *Desh.* 2d ed. Lam., p. 540, t. vi, 1835.

Spec. Char. *Testá ovatá, transversá, elongatá, crassá, valdè inæquilaterá; anticè rotundatá, posticè productá, cuneatá, subrostratá; umbonibus rugosis.*

Shell ovate, transversely elongate, thick, very inequilateral; anterior side rounded, posterior produced, somewhat pointed, and obtusely angulated or wedge-shaped; umbones rugose.

Length, 3½ inches.

Locality. Stutton, Grays. Recent, Britain, France, and Germany.

This species is very abundant at Grays, where specimens have been obtained in great perfection, and although by no means rare at Stutton, they are in a very decorticated condition. Both these localities present us with forms deviating considerably from what are generally met with in the living state, more especially those from the latter locality, where they attain a magnitude of nearly four inches in length, and appear to have a greater proportion of the shell on the anterior side of the umbo, while in those from Grays, which are smaller, that side is shorter and proportionally broader than in the living specimens; in the Grays fossil the posterior side is obtusely pointed, and the whole shell is more angular, while the Stutton specimens are rather less so than the general or common form of the recent shell; as these extremes of variation can readily be connected through the living species, it is presumed that the differences are wholly insufficient for specific separation, and I have no hesitation in assigning the fossils of both localities as identities of the existing British species; the dental characters are also similar, the anterior tooth of the right valve being coarsely crenated on the upper or dorsal side, and somewhat compressed; the elongated lamina on the posterior side is linear, sharp, and nearly smooth.

It was at first thought, that as the Land and Fresh-water shells found in the newer Tertiaries of this country are *all* assumed to be the Homogenitors of existing animals, a name alone with reference to a work in which they have been described would have been sufficient for Geological purposes; but upon more minute examination many of them have been found to present characters deviating in so great a degree, that their identity has by some Conchologists been called in question; it is therefore now considered desirable that a figure and description of a part of them at least should be given, more especially as they have never yet appeared in any publication as British Fossils.

3. Unio pictorum. *Linnæus.*

Mya pictorum. *Linn.* Syst. Nat., ed. 12, No. 28, p. 1112, 1767.
— — *Poli.* Test. Sicil., vol. i, p. 2, t. 9, figs. 6, 7, 1791.
Unio pictorum. *Drap.* Moll. Tert. et Fluv. de Fr., pl. 11, fig. 4, 1805.
— — *Gray.* Man. Land and F.-W. Shells, p. 295, pl. 2, fig. 11, 1844.
— — *Rossm.* Icon. Land und Sussw. Moll., figs. 71, 196; pl. 29, fig. 409; pl. 58, figs. 762—766, 1844.
— — *Forb.* and *Hanl.* Hist. Brit. Shells., vol. ii, p. 142, pl. 39, fig. 1, and pl. Q, fig. 2 (Animal), 1849.

Mysca pictorum. *Turt.* Brit. Biv., p. 245, 1822.
— Deshayesii. *Brown.* Illust. Brit. Conch., p. 81, pl. 32, figs. 1—4.
— — *Rossm.* Icon. Land und Sussw. Moll., p. 23, pl. 13, fig. 197.
— longirostris. *Ziegl.* in Rossm. Iconog., pt. 3, p. 26, pl. 14, fig. 200, and pt. 12, pl. 54, fig. 38.
Ency. Meth., t. 248, fig. 4.

Spec. Char. *Testá transversá, elongatá, subovatá, inæquilaterá, anticè rotundata, posticè, angulatá, vix rostrata; margine dorsali et ventrali subrectá.*

Shell transversely ovate, elongate, inequilateral; anterior side rounded, posterior angulated, scarcely rostrated; dorsal and ventral margins nearly straight.

Length, 2 inches.

Locality. Grays, Cropthorn. Recent, Britain, France.

This shell appears very rare as a British fossil; one specimen in the cabinet of Mr. Pickering is of a form that may be determined without much hesitation as belonging to this species, and resembles rather the thinner variety of the recent shell. The principal or perhaps only difference observable between this and the preceding species in the fossil state, is a more elongated dorsal area, less sloping on the posterior side, so that the ventral margin is more parallel with the upper edge than in *U. tumidus.* A specimen in the British Museum, from the same locality, seems to possess the like determinable characters, and one in the Museum of the Geological Society, presented by Mr. Strickland as from Cropthorn appears to be of this species. These specimens are all that I have seen, they mostly resemble fig. 766, *Rossmasler.*

Anodonta, *Cuvier,* 1798.

Musculus (sp.). *Lister.*
Mytilus (sp.). *Linn.*
Limnæa and Limnæoderma (sp.). *Poli,* 1791.
Anodontites. *Brug.,* 1799.
Dipsas. *Leach,* 1814.
Appius. *Id.* MSS., fide *Gray,*
Anodon. *Oken.,* 1815.
Cristaria. *Schum.,* 1817.
Strophitus. *Rafinesque,* 1820.
Lastena. *Id.*
Symphynota (sp.). *Lea.,* 1832.
Odatelia. *Rafinesque,* 1832.
Lamproscapha. *Swains.,* 1840.
Hemiodon. *Id.*
Patularia. *Id.*

Generic Character. Shell equivalve, inequilateral, ovate, transverse, usually thin, more or less eared, and closed; smooth, and in the recent state covered with an epidermis generally eroded at the umbones. Hinge linear, edentulous, or with one elongated lamina on the posterior side. Ligament external. Impression of the mantle without a sinus.

The animal of this genus closely resembles that of the preceding one, being furnished with a large fleshy, compressed foot, and the hinder part of the mantle is ornamented with short and pointed tentacles; anal opening is large, and the margin plain.

These animals are bisexual, and the young shell is completely formed before exclusion, although differing then materially in shape from that of its parent. Their power of multiplication is said to be enormous. Mr. Lea states that he counted not less than six hundred thousand young in an adult specimen.

The shells of this genus are also exceedingly variable, more especially in the outward form; some species have the hinge area largely elevated into the form of a wing, and in consequence of these variations, as well as from differences in size of dental characters, they have also been separated into several genera.

It appears to be a modern genus, and only yet known in the fossil state from the newer Tertiaries.

1. Anodonta cygnea, *Linnæus*. Tab. XI, fig. 11.

Mytilus cygneus. *Linn.* Syst. Nat., ed. 12, No. 257, 1158, 1767.
— — *Mat.* and *Rack.* Linn. Trans., vol. viii, pl. 3A, fig. 2, 1807.
— — *Poli.* Test. Sicil., vol. ii, p. 212, pl. 33, fig. 2, 1795.
— — *Sheppard.* Trans. Linn. Soc., vol. xiii, p. 84, pl. 5, fig. 3, 1822.
— anatinus. *Linn.* Syst. Nat., ed. 12, p. 1158.
— — *Poli.* Test. Sicil., vol. ii, p. 213, pl. 33, fig. 1, 1795.
— Avonensis. *Mont.* Test. Brit., p. 172, 1803.
— — *Mat.* and *Rack.* Linn. Trans., vol. viii, p. 250, pl. 3.
— macula. *Sheppard.* Linn. Trans., vol. xiii, p. 88, pl. 5, fig. 6, 1822.
stagnalis. *Sowerby's* Brit. Miscellany, pl. 16.
— — *Brown.* Illust. Brit. Conch., pl. 27, fig. 2, 1827.
— dentatus. *Turt.* Conch. Dict., p. 115, 1819.
— incrassatus. *Sheppard.* Linn. Trans., vol. xiii, p. 85. pl. 5, fig. 4.
Anodonta cygnea. *Pfeiff.* Land und Sussw. Moll., p. 111, t. vi, fig. 4, 1821.
— anatina. *Id.* - - - - p. 112, t. vi, fig. 2, ,,
— intermedia. *Id.* - - - - p. 113, t. vi, fig. 3, ,,
— ventricosa. *Kickx.* Moll. Brab. Aust., p. 80.
— piscinalis. *Nils.* Moll. Succ. Ter. et Fluv., p. 116, fide *Forb.* and *Hanl.*
— cygnea. *Rossm.* Icon. Land and Sussw. Moll., pp. 1, 111, t. 3, fig. 67, 1835.
Anodon paludosa. *Turt.* Brit. Biv., p. 240, pl. 15, fig. 6, 1822.
Symphynota cygnea. *Lea.* Obs. on the Gen. Unio, vol. i, p. 70, 1832.

Spec. Char. Testá oblongo-ovata, sæpe compressá, tenui, interdum tumidá et incrassatá; anticè rotundatá, posticè productá, et angulatá; natibus depressiusculis, rugosis.

Shell oblongo-ovate, generally compressed and thin, sometimes tumid or inflated, occasionally thick; anterior side rounded, posterior produced, and angulated; umbones rather flat, with undulating rugosities.

Length, 3½ inches. *Height*, 2 inches.

Locality. Stutton, Clacton, Grays (*Pickering*), Cropthorn, and Bacton (*Morris*).
Recent, Britain, and North of Europe.

This species is abundant in individuals both at Stutton and Clacton, the two localities of Fresh-water Deposits that I am best acquainted with, although from their great fragility specimens are very difficult to obtain in any degree of perfection. In all probability it was equally variable in the earlier periods of its existence, as it is at the present day. The few specimens that I possess present considerable differences in outward character, from which, therefore, it is not unfair to infer, that amongst a greater number, and from different localities, we should, as in the living shell, which varies under different external conditions, also have a great variety in the fossil state.

The specimens from Stutton (generally in a decorticated condition) are very inequilateral, the anterior side being particularly short in proportion to the other, and the shell is rather less in length comparatively, but it is almost impossible to obtain a specimen at that locality without some slight degree of distortion, and its true characters are therefore difficult to determine; but there is no doubt it is the homogenitor of our old acquaintance, which in the living condition puts on such a variety of shapes. The one from Clacton is more elongate, and corresponds with a variety abundant in the Thames above Maidenhead, in Berkshire. Mr. J. E. Gray (Manual of Land and Fresh-water Shells of the British Islands) considers the many different forms found in this country, and described under distinct specific names, to be only modifications of the same species, and the authors of the 'History of British Mollusca' are of the same opinion; from what I have seen I fully acquiesce in their decision, and the fossil specimens that have come under my observation may be arranged in the same category.

As the geographical range of this species extends over the greater part of Europe, we may naturally expect to find it in the fossil state.

CYRENA, *Lamarck*. 1818.

VENUS (sp.). *Chem.*
TELLINA (sp.). *Gmelin.*
CYCLAS (sp.). *Lam.*, 1799, 1801.
CORBICULA. *Megerle*, 1811.
CYANOCYCLAS. *Ferussac*, 1818.
GELOINA. *Gray*, 1844.
VELORITA. *Id.* „

Generic Character. Shell equivalve, roundly trigonal or subovate, generally tumid or inflated, more or less inequilateral, thick and strong. Hinge with three cardinal teeth, and a large extended lateral tooth on each side, serrated or striated in some species: in the recent state covered with an epidermis: ligament external: impression of the mantle without a sinus.

The animals constituting this genus are in a recent state inhabitants of pure fresh-water, and are only known in tropical or sub-tropical rivers, where the climate is particularly mild. They are described by Malacologists as not differing essentially from the fresh-water genus *Cyclas*, excepting in their shelly covering, which in this shell is thick and opaque, while in Cyclas it is thin and corneous or semitransparent. Lamarck placed them in his Family Conchæ fluviatiles, in consequence of a resemblance to the animals of the Veneridæ, and from possessing the lobes of the mantle prolonged into siphonal tubes, distinct and separated down to their bases.

Although in the recent state, this is a genus of pure fresh-water origin; specimens have been found in the Estuary Deposit of the Norwich or Mammaliferous Crag almost too numerous to be considered as entirely of accidental introduction.

1. CYRENA CONSOBRINA, *Caillaud*. Tab. XI, fig. 15, *a—c*.

CYRENA CONSOBRINA. *Cail.* Voy. en Egypt, t. 2, pl. 61, figs. 10, 11, 1823.
— — Desc. de l'Egypt Hist. Nat., t. 22, p. 193, pl. 7, fig. 7, 1, 2, 3.
— TRIGONULA. *S. Wood.* Mag. Nat. Hist., vol, vii, p. 275, fig. 45, *a*, *b*, *c*, 1834.
— — *Lyell.* Elem. Geol., 2d ed., vol. i, p. 61, fig. 26, 1841.
— GEMMELLARII. *Phil.* En. Moll. Sic., vol. i, p. 39, t. 4, fig. 3, 1836.
— — *Id.* - - - vol. ii, p. 31, 1844.
— DUCHASTELLII. *Nyst.* Bull. de la Soc. de l'Acad. Roy. de Brux., p. 113, pl. 1, figs. 1—4, 1838.

Spec. Char. *Testá rotundato-trigonulá, subæquilaterá, tumidá, crassá; lineis elevatis, concentricis, lævibus, distantibus; cardine tridentato, divergens, inter se insertis; dentibus lateralibus longissimis, perpendiculariter striatis.*

Shell roundly trigonal, subequilateral, tumid, and thick; externally ornamented with smooth, concentric, sharp, and distant ridges; hinge with three cardinal diverging teeth in each valve, lateral teeth elongated and perpendicularly striated.

Locality. Mam. Crag, Bramerton, Wangford, and Bulcham (*Alexander*).
Stutton and Grays. Recent, River Nile.

This species is exceedingly abundant in the purely Fresh-water Deposit at Stutton, where the valves are commonly united, as they are in general with fresh-water species, individual specimens may be obtained by hundreds. When the shell was first described and figured in the 'Mag. Nat. Hist.,' as referred to above, it was imagined to be specifically distinct in consequence of the posterior side being somewhat angulated, in which character it differs from the general form of the recent species, now considered as identical; but among a large series of the British fossils this character disappears, and as a distinguishing mark cannot be faithfully relied upon, as the specimens from Grays do not possess it, but have both sides more rounded, and correspond in form precisely with the Nile shell; there is every reason, therefore, to believe its descendant to be now living in the rivers of Egypt, to which part of the world it appears to have retired through the once existing fresh-waters of Sicily, for I consider the shell figured by Philippi, as nothing more than a variety of this species, although he has described it as having only two cardinal teeth in each valve, while there are three perfectly distinct in our shell; the anterior one in the right valve and the posterior in the left being the smallest, these in imperfect specimens of the fossil might have been overlooked.

The outline of our shell is roundly trigonal, the posterior side being rather more angular and larger than the other, and the diameter is generally greater in a longitudinal direction, but in others it is even higher than long; the right valve has one central, triangular, sub-bifid, cardinal tooth immediately beneath the umbo, and another on each side of it diverging at a very considerable angle; in the left valve, the three cardinal teeth correspond in form with the interstices of the right valve, two large elongated and elevated lateral teeth, occupy the whole of the dorsal portion of the shell in the left valve, and these fit into depressions of the right one so as firmly to fix the two pieces when they are closed, and on each of these lateral teeth, as also on each side of the dental furrow in the right valve, are numerous fine striæ perpendicular to these lateral ridges, and on the inside of the callus or fulcrum for the support of the ligament are the same markings; the muscular impressions are somewhat unequal in size, the posterior one being the larger and of a subquadrate form, while the anterior is more triangular, these are connected by the line of the mantle-mark which has an incipient sinus or indentation close to the posterior adductor; these marks are seldom deeply impressed and not always visible, but when seen, they do not extend beyond the extreme verge of the lateral teeth. On the ouside, the shell is ornamented with numerous, sharp, generally equidistant ridges, parallel to the margin, and in the concave spaces between them may be seen the lines of growth; a faint line is visible in perfect specimens curving from the umbo on each side, forming a sort of large corselet and lunule, of an elongated ovate form, beyond which the ridges do not extend, precisely similar to what is seen in the Ægyptian shell: in most of the specimens of the fossil, the outside is more or less decorticated, but there is very little of erosion visible in any of my specimens at the umbones, nor is the ligament ever preserved, but that is not very thick even in the recent state.

It has been thought necessary to be thus tediously particular in giving all the minutiæ of characters belonging to this species, in order to remove any doubt respecting its identity with the well-known shell now inhabiting a part of the world where climatal conditions are different from what it is supposed were those under which it existed in this country.

A few specimens of this species have been obtained by Capt. Alexander and myself from the Coralline Crag at Gedgrave, near the mouth of the Butley River, but in association with some *Helices* and other land shells, all identical with existing animals. At this locality, the Crag appears to have been denuded of its more Coralline portion, and these shells are intermixed near the present surface with the remains of the Marine Molluscs of the lower part of that Deposit.

Depending, therefore, upon this evidence alone, we can scarcely consider the Geological Age of this species to date its existence so far back as the Period of the Coralline Crag.

CYCLAS.* *Bruguière*, 1792.

SPHÆRIUM. *Scopoli*, 1777.
NUX. *Humph.*, 1797.
CORNEA. *Megerle*, 1811.
CORNEOCYCLAS. *Ferus.*, 1818.

Generic Character. Shell equivalve, subequilateral, more or less tumid or inflated, thin and closed, sometimes semipellucid, smooth or slightly marked by lines of growth, and in the recent state covered with an epidermis. Hinge furnished with one or two cardinal teeth, and distant lateral teeth on each side. Impressions of the adductor muscles indistinct. Palleal impression with a small sinus. Ligament external, slender.

Animal suborbicular, its mantle open in front, with plain or simple margins; siphon produced and divided at the extremity into two distinct tubes, the edges plain or without fringes: foot large, compressed, extensile, and more or less pointed.

Priority of name most properly belongs to Scopoli, but the small and corneous shells here included are so universally known by the above designation, that I do not feel disposed to make the alteration, more particularly as *Sphærium* has been since adopted in another department of Natural History as a Generic Term. Animals now determined to belong to three distinct Genera were included by Bruguière, as well as by Lamarck, under the name of *Cyclas*, and the latter author subsequently proposed to sever from them the thicker and more ponderous species, and unite them into a genus by themselves, under the name of *Cyrena*.

The shells constituting this genus are for the most part very thin, and of a corneous or semitransparent texture in the living state; their little inhabitants are possessed of considerable powers of locomotion, and move about in the water with facility by means of their large and flexible foot; they frequent pools, ditches, lakes, and sluggish streams, and when still, are generally found buried in the sand or muddy bottom of the water. They are viviparous or rather ovoviviparous, and the young are not only perfectly formed before exclusion, but are sometimes of considerable magnitude, occupying a large portion of the parent shell to the manifest inconvenience of the mother.

They are purely Fresh-water Molluscs, and the Formations in which they are found fossil, are either of Fresh-water origin or of Estuaries in close proximity into which they have been washed. Species have been figured and described as belonging to this genus from the Wealden Formation; an undoubted *Cyclas* was found by myself in the Fresh-water Deposit at Hordwell, belonging to the Older Tertiaries.

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* Etym. κυκλάς, circular.

1. Cyclas rivicola, *Leach.* MSS.

Tellina cornea. *Linn.* Syst. Nat., ed. 12, No. 72, p. 1120 (part), 1767.
— — Var. *β. Mat.* and *Rack.* Linn. Trans., vol. viii, p. 59.
Cardium corneum. *Mont.* Test. Brit., p. 86, 1803, Var.
— nux. *Da Costa.* Brit. Conch., p. 189.
Cyclas cornea. *Drap.* Moll. Terr. et Fluv. Fr., p. 128, t. 10, figs. 1—3.
— — *Brard.* Coq. Ter. et Fluv. des Env. de Par., p. 219, t. 8, figs. 2, 3.
— rivicola. "*Leach*" in *Lam.* Hist. des An. s. Vert., t. v, p. 558, 1815.
— — *Turt.* Brit. Biv., p. 248, pl. 11, fig. 13, 1822.
— *Pfeiff.* Land und Sussw. Moll., p. 121, pl. 5, figs. 3—5, 1821.
— — *Sowerby.* Genera of Shells, No. 38, Cyclas.
— — *G. Sow., Jr.* Conch. Man., fig. 111, 1842.
— — *Forb.* and *Hanl.* Hist. Brit. Moll., vol. ii, p. 111, pl. 37, figs. 1, 2.
Ency. Meth., pl. 302, fig. 5.

Spec. Char. Testâ transversâ, ovatâ, tumidulâ, crassiusculâ, subæquilaterâ, anticè et posticè convexâ; concentricè striatâ; ligamento cardinali conspicuo.

Shell transversely ovate, somewhat tumid and strong, slightly inequilateral, anterior and posterior sides rounded; finely striated concentrically; cardinal area conspicuous.

Length, 1 inch. *Height,* $\frac{5}{8}$ths.

Locality. Southend (*Warburton*), Faversham (*Trimmer*).

I have not myself met with this species as a fossil, but specimens in that state have been obtained by Messrs. Warburton and Trimmer, from Faversham and Southend. The specimens referred to are in the Museum of the Geological Society.

2. Cyclas cornea, *Linnæus.* Tab. XI, fig. 2, *a—b.*

Tellina cornea. *Linn.* Syst. Nat., ed. 12, No. 72, p. 1120, 1767.
— — *Chem.* Conch. Cab., t. vi, p. 136, t. 13, fig. 133, bad.
— — *Penn.* Brit. Zool., ed. 4, p. 89, pl. 49, fig. 36.
— — *Donov.* Brit. Shells, vol. iii, t. 96, 1802.
— rivalis. *Müll.* Verm. Hist., t. ii, p. 202.
— stagnicola. *Sheppard,* Linn. Trans., vol. xiv, p. 150, 1825.
Cardium corneum. *Mont.* Test. Brit., p. 86, 1803.
Cyclas cornea. *Pfeiff.* Deutsch. Land und Sussw. Moll., p. 120, t. v, figs. 1, 2, 1821.
— — *Turt.* Brit. Biv., p. 248, pl. 11, fig. 14, 1822.
— — *Gray.* Man. Land and F.-W. Shells, p. 280, pl. 1, fig. 2, 1840.
— — *Jenyns.* Trans. Camb. Philos. Soc., p. 295, 1831.
— — *Phil.* En. Moll. Sic., vol. ii, p. 30, 1844.
— — *Forb.* and *Hanl.* Hist. Brit. Moll., vol. ii, p. 113, pl. 37, figs. 3—6, 1849.
— rivalis. *Drap.* Moll. Terr. et Fluv., p. 129, pl. 10, figs. 4, 5, 1805.
— — *Brard.* Coq. Terr. et Fluv. Env. de Paris, p. 222, pl. 8, figs. 4, 5, 1815.
— flavescens. *Mac Gilliv.* Moll. Aberd., p. 246, 1843, fide *Forb.* and *Hanl.*

Spec. Char. Testâ transversâ, ovatâ, inflatâ, tenui, et fragili, subinæquilaterâ; posticè majiore, subquadratâ, anticè rotundatâ, concentricè striatâ, margine ventrali leviter arcuatâ, apicibus obtusis.

Shell transverse, ovate, tumid, very thin and fragile, slightly inequilateral, posterior side the larger, and subquadrangular; anterior rounded, very finely striated concentrically; ventral margin lightly curved.

Length, ½ an inch. *Height*, ⅜ths of an inch.

Locality. Mam. Crag, Bulcham, Southwold.
Cropthorn, Grays, Clacton, Stutton, Faversham.
Recent, Britain, France, Sicily.

This species is abundant in the Fresh-water deposits of Clacton and Stutton. The principal form is nearly ovate, and some have both sides equally rounded, but occasionally the posterior is obtusely angulated, the line of hinge carrying the lateral tooth rather further backwards than ordinary, giving it on that side a somewhat square outline. The animal in the recent state has strong adductor muscles, but they have made only a very indistinct impression upon the shell; the hinge is furnished with an apparatus well adapted to assist the close security of the valves, the right one having a sharp prominent arched or diverging tooth, immediately beneath the umbo, which locks into or between two others of similar form in the left valve; the lateral teeth are prominent and at unequal distances, that on the posterior side being considerably the more distant; in the left valve there is one before and one behind the umbo, and in the right there are two on each side, between which the single one is inserted when the valves are closed. Some specimens are quite smooth, while others are distinctly marked with numerous, obtuse concentric ridges. In the young state the shell is much flatter than when full grown.

This species is common throughout Europe, extending its range from Sicily on the south to Sweden in the North.

A few specimens of this fragile shell were found by Capt. Alexander, in the Estuary portion of the Mammaliferous Crag.

PISIDIUM,* *Pfeiffer*. 1821.

TELLINA (sp.). *Linn.*
CARDIUM (sp.). *Poli.*
CYCLAS (sp.). *Lam.*
PISUM. *Megerle*, 1811, fide *Gray*.
PERA. *Leach*, MSS., 1819.
EUGLESIA. *Id.* „ 1820.
GALILEJA. *Costa*, 1839, fide *Phil.*

Generic Character. Shell small, equivalve, inequilateral, subovate, more or less inflated, somewhat thin; in the recent state subpellucid, and covered with an epidermis; smooth or concentrically striated. Hinge with one or two cardinal, and two lateral teeth in each valve. Ligament external, situated on the shorter side. Impressions of the adductors and of the mantle indistinct.

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* Etym. *Pisum?*

Animal subovate, with its mantle open on the anterior side and the margins without fringes, united towards the posterior, where it forms a short and single siphon, the orifice of which is plain; foot large, tongue-shaped, and extensile.

This genus has been separated from *Cyclas* in consequence of a difference in their animal inhabitants, those of *Cyclas* having the siphon dichotomous, or divided near the end into distinct tubes, whereas in this it remains single and simple, to the extremity, and is not so long. The species as yet known are all small, and have similar habits to the preceding, frequenting ditches or pools of stagnant water, or where the stream is not very rapid, and like the allied genus they are perfectly formed in the parent animal before exclusion. They differ also in having the side on which the ligament is situated, the posterior, shorter than the anterior; in *Cyclas* it is the reverse.

It has not as yet been met with in any Deposit of an anterior date to the Newer Tertiaries.

1. **Pisidium amnicum**, *Müller*. Tab. XI, fig. 1, *a—b*.

Tellina amnica. *Müll.* Verm. Terr. et Fluv., pt. 2, p. 205, 1774.
— — *Chem.* Conch. Cab., t. vi, p. 138, t. 13, fig. 134, 1782.
— rivalis. *Maton.* Trans. Linn. Soc., vol. iii, p. 44, pl. 13, figs. 37, 38.
— — *Donovan.* Brit. Shells, vol. ii, pl. 64, fig. 2, 1801.
Cardium amnicum. *Mont.* Test. Brit., p. 86, 1803.
Cyclas palustris. *Drap.* Moll. Ter. et Fluv., p. 131, pl. 10, figs. 15, 16, 1805.
— obliqua. *Lam.* Hist. des An. s. Vert, t. v, p. 559, 1815.
— — *Brown.* Illust. Brit. Conch., pl. 17, fig. 14, 1827.
— amnica. *Turt.* Brit. Biv., p. 250, pl. 11, fig. 15, 1822.
— — *Id.* Land and F.-W. Shells, p. 15, pl. 1, fig. 5.
— — *Lyell.* Elem. of Geol., 2d ed., vol. i, p. 227, fig. 103, 1841.
Pera fluviatilis. *Leach,* MSS., fide *Jenyns.*
Pisidium obliquum. *Pfeiff.* Land und Sussw. Moll., pt. 1, p. 124, pl. 5, figs. 19, 20, and pl. 1, fig. 19, 1821.
— — *Phil.* En. Moll. Sic., vol. ii, p. 31, 1844.
— amnicum. *Jenyns.* Trans. Camb. Phil. Soc., vol. iv, p. 309, pl. 21, fig. 2.
— — *Forb.* and *Hanl.* Hist. Brit. Moll., vol. ii, p. 133, pl. 37, figs. 8, 9, and pl. O, fig. 8, 1849.

Spec. Char. *Testâ ovatâ, obliquè trigonâ, ventricosâ, sulcato-striatâ umbonibus obtusiusculis.*

Shell ovate, obliquely trigonal, ventricose, striated or sulcated, umbones rather obtuse.

Length, ½ an inch.

Locality. Mam. Crag, Southwold.

Grays, Erith (*Morris*), Cropthorn (*Strickland*), Clacton, Stutton. Faversham, and Kennet Valley (*Pickering*). Recent, Britain, France, Sicily.

This is a most abundant shell at Clacton and Stutton, and is subject to a good deal of variation, both in the outline and in its exterior ornament; in all varieties the young shell is generally flatter or more compressed than when full grown; there is also a difference in the substance of the shell, some specimens are thin and tender, while others are quite thick and strong. Those which are most flat are also in general thinner, and have a greater length from the anterior to the posterior, and are longer also on the hinder side. The specimens from Grays are mostly the thicker variety, in which the posterior side is remarkably short and truncate, and the striæ on the outside are finer and more numerous: this has been called *P. sulcatum* (fig. 1, *b*), but it is, I believe, no more than a variety, as a recent acquisition of numerous specimens show every intermediate alteration to those which are much less inequilateral, and have more distant ridges upon the exterior. These fossils seem to present rather more differences than any specimens that I have seen of the recent shell, and it is, therefore, thought desirable to have the two extreme forms represented, in order more effectually to display these variations. The hinge is furnished with two cardinal teeth in each valve, one small and simple, the other large and bifid, the posterior one in the right is bifid, while in the left valve it is the anterior; there is a large prominent lateral tooth before and behind the umbo at nearly equal distances in the left valve, and two on each side in the right: this hinge line is broad with teeth of corresponding magnitude in the thick variety, and in some specimens these form with the umbo an angle of little more than 90°, whereas in others of the elongated variety that angular line will be as large as 130°. In the thick variety, the posterior side projects but very little behind the umbo, nearly the whole of the animal being on the anterior side of the shell; in other specimens, this side is two fifths as large as the other, and the shell much less inequilateral. Similar differences may be also observed in the sculpture of the exterior, they are always ornamented more or less with concentric or elevated lines of growth, but in some, these markings are numerous, rounded, and placed close together, while in others they are sharp and narrow with a considerable plain concave space between them.

It is a common shell in England, in the living state, and has a wide Geographical distribution in Europe, extending from Sicily to Sweden.

A few specimens also of this species were obtained by Capt. Alexander from the Mam. Crag.

2. PISIDIUM HENSLOWIANUM, *Sheppard.*

TELLINA HENSLOWIANA. *Shep.* Trans. Linn. Soc., vol. 14, p. 150, 1825.
CYCLAS APPENDICULATA. *Turt.* Man. Land and F.-W. Shells, pl. 1, fig. 6.
PERA APPENDICULATA. *Leach,* MSS., fide *Jenyns.*
PISIDIUM HENSLOWIANUM. *Jenyns.* Trans. Cam. Phil. Soc., vol. iv, p. 308, t. 21, figs. 6—9, 1831.
— — *Gray.* Man. Land and F.-W. Shells, p. 285, pl. 1, fig. 6.
— — *Forb.* and *Hanl.* Hist. Brit. Moll., vol. ii, p. 131, pl. 37, fig. 11, 1849.

Spec. Char. Testâ minutâ, obliquâ, sub-ovatâ, valdè inæquilaterâ, tumidâ; anticè productiore attenuatâ, vel diminuatâ; umbonibus prominulis et appendiculatis.

Shell minute, oblique, sub-ovate, very inequilateral, and generally ventricose; anterior side much the longer; umbones slightly prominent. furnished with a projecting appendage.

Length, $\frac{1}{5}$th of an inch.

Locality. Clacton, Stutton, Cropthorn (*Strickland*), Grays (*Pickering*).

Recent, Britain, Ireland, Germany.

This is an abundant shell at the localities, Clacton and Stutton, where they are often found with the valves united.

The form is somewhat variable, but in general it may be described as triangularly ovate, the posterior side being higher, that is from the umbo to the ventral margin, diminishing towards the anterior side which is narrower and rounded, it is very inequilateral and tumid, having at the umbo an appendage or projection, which is its most distinguishing character.

3. PISIDIUM PULCHELLUM, *Jenyns.*

PERA PULCHELLA. *Leach*, MSS., fide *Jenyns*.
PISIDIUM PULCHELLUM. *Jenyns.* Trans. Camb. Phil. Soc., vol. iv, p. 306, t. 21, figs. 1—5, 1831.
— — *Gray.* Man. Land and F.-W. Shells, p. 284, pl. 12, fig. 151.
— — *Forb.* and *Hanl.* Hist. Brit. Moll., vol. ii, p. 128, t. 37, figs. 12, 13, 1849.
— FONTINALE. *Brown.* Illust. Brit. Conch., 2d ed., pl. 39, fig. 23.
— — *Pfeiffer.* Land und Sussw. Moll., pt. 1, p. 125, t. v, figs. 15, 16, 1821.
— — *Phil.* En. Moll. Sic., vol. ii, p. 31, 1844.
CYCLAS FONTINALIS. *Drap.* Moll. Terr. et Fluv., p. 130, t. x, fig. 12?
GALILEJA TENEBROSA. *Da Costa.* Corresp. Zool., fide *Phil.*

Spec. Char. Testâ minutâ, oblique-cordatâ, valdè inæquilaterâ, ventricosâ, concentricè striatâ, tenui, fragili; umbonibus prominulis.

Shell small, obliquely heart-shaped, very inequilateral, ventricose, finely striated concentrically, thin and fragile; umbones slightly prominent.

Length, $\frac{1}{8}$th of an inch.

Locality. Stutton, Clacton, Grays (*Pickering*), Copford (*J. Brown*).

Recent Britain, France, Sicily.

This appears to be by no means a rare shell in any of the above localities, though it is less abundant than *Henslowianum* at the two former, and like the recent shell it is subject to much variation.

4. Pisidium pusillum, *Turton.*

Tellina pusilla. *Turt.* Conch. Dict., p. 167, 1819.
Cyclas pusilla. *Turt.* Brit. Biv., p. 251, t. 11, figs. 16, 17, 1822.
— — *Id.* Land and F.-Water Shells, pl. 1, fig. 7.
— gibba. *Alder.* Trans. Nat. Hist. Soc., Newcastle, vol. i, p. 41.
— fontinalis. *Drap.* Moll. Terr. et Fluv. France, p. 130, pl. 10, fig. 8, 1805.
Euglesia Henslowiana. *Leach,* MSS., fide *Jenyns.*
Pisidium pusillum. *Jenyns.* Trans. Camb. Phil. Soc., vol. iv, p. 302, t. 20, figs. 4—6, 1831.
— — *Forb.* and *Hanl.* Hist. Brit. Moll., vol. ii, p. 123, t. 37, fig. 10, and pl. O, fig. 9, 1849.

Spec. Char. Testâ pusillâ, orbiculato-ovatâ, compressiusculâ, subinæquilaterâ, subtilissimè striatâ; umbonibus prominulis.

Shell small and slender, roundedly ovate, somewhat compressed, slightly inequilateral, very finely striated; umbones but little projecting.

Length, $\frac{1}{8}$th of an inch.

Locality. Clacton, Copford (*J. Brown*), Grays (*Pickering*). Recent, Britain, France.

This species is by no means abundant in my Cabinet from the former locality, while Mr. Brown has found it in large numbers, in what is, perhaps, a more Modern deposit at Copford. The principal distinction of this shell appears to be its generally greater gibbosity; it is less inequilateral than any of the other species.

We have thus, it seems, four well determined species in this genus from the purely Fresh-water Deposits of this Kingdom, while the living British *Pisidia* have been separated by British Conchologists into not less than eight or nine. I confess, not to be very well acquainted with the recent forms, but judging from a general knowledge of the variability amongst the fresh-water shells in particular, I think too much dependence has been placed upon differences, arising from locality and other external causes, and that slight variations resulting therefrom have been considered of sufficient importance for the establishment of distinct species; I am inclined to believe, all the forms existing in England might be included in four or at most five species.

In the beautiful and extensive collection of British Land and Fresh-water Molluscs, in the Cabinet of Mr. John Pickering, are numerous forms of this genus, and I have applied to that gentleman for his assistance upon the recent as well as fossil *Pisidia,* and as he has devoted many years to the examination of these animals, I conceive his opinion to be of much more value than my own; he says (in Lit.) "I am of opinion, we have not *more* than five species of *Pisidia* in this country, viz., *P. amnicum, P. Henslowianum, P. pulchellum, P. obtusale,* and *P. pusillum.* After selecting the first three species, there are many forms remaining, from which without much difficulty may be selected *pusillum* which appears a less variable species than most of the others; then follows *obtusale* the most variable of the whole, differing in almost every locality, in some comparatively large and free growing, in others small and stunted according to the nature of the habitat, changing its form in each stage of growth from compressed and decidedly inequilateral, to very tumid and nearly equilateral, even in the same locality, yet merging so imperceptibly into each other, that they cannot be separated without dismembering what appears to me a good and natural species; and it is yet a doubt in my mind whether on a fuller investigation of the genus, '*pusillum*' can continue to rank as a species."

"These opinions have not been suggested by the sight of a few isolated and typical forms, but after a long and patient examination of several hundred specimens, collected in various localities in the counties of Berks, Cumberland, Devon, Dorset, Essex, Hants, Herts, Kent, Lancashire, Middlesex, Northumberland, Surrey, Sussex, and Yorkshire."

In the form of my fossil specimens of *pusillum*, I can see no material difference from *obtusale*, except that in the latter the shell is more tumid; but the differences between the two do not appear to me to be more evident than some of the forms are in the fossil *Cyclas cornea*, where specimens are occasionally excessively tumid, while others of the same length and height are much compressed, and the like differences are observable in specimens of *P. amnicum*. The few individuals of these last two species, that I have seen from the Mam. Crag, are of the ordinary form or intermediate between the extremes we have had figured.

LEPTON,* *Turton*, 1822.

SOLEN (sp.). *Mont.*, 1803.
LUTRARIA (sp.). *Gray*, 1825.
PSAMMOBIA (sp.). *Brown*, 1827.
ERYCINA (sp.). *Nyst*, 1844.

Generic Character. Shell equivalve, subequilateral, ovate, or subtrigonal, thin and compressed; umbones more or less acute, not prominent; surface elegantly ornamented; margin plain; hinge composed of two diverging teeth in each valve, between which is placed the ligament wholly internal. Impression of the mantle simple or without a sinus.

The animal of this genus is said to have its mantle freely open in front with a fringe all round the margin, and capable of extending itself considerably beyond the shell; a short siphonal tube with a single aperture, and a thick foot furnished with a byssal groove; one of the filaments of its marginal fringe is longer and larger than the others.

In addition to the two recent British species, the Crag contains one quite distinct, with another doubtful one resembling what appears to be a different species in the Campinian beds of Belgium. Conrad also describes one living in the Seas of America, as well as another from the Upper Tertiaries of that country, but few specimens of either of these have been examined carefully, and their correct specific establishment is not at present upon a firm and stable basis; and my own species are not given with any great confidence, but more to call the attention of Collectors to their probable existence.

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* Etym. Λεπτος, thin.

Specimens apparently belonging to this genus have also been obtained at Barton from the London Clay or Older Tertiaries.

1. Lepton squamosum, *Montague.* Tab. XI, fig. 8.

Solen squamosus. *Mont.* Test. Brit., p. 565, 1803.
— — *Mat.* and *Rack.* Linn. Trans., vol. viii, p. 48, 1807.
— — *Turt.* Conch. Dict., p. 164, 1819.
— — *Dillw.* Desc. Cat. Rec. Shells, p. 70, 1817.
— — *W. Wood.* Ind. Test. p. 16, 1825.
Psammobia punctura. *Brown.* Illust. Conch. Gr. Brit., pl. 16, fig. 7, 1827.
Lepton squamosum. *Turt.* Brit. Biv., p. 62, pl. 6, figs. 1—3, 1822.
— — *Flem.* Brit. An. p. 429, 1828.
— — *S. Wood.* Catalogue, 1840.
— — *Thorpe.* Brit. Mar. Conch., p. 49, 1844.
— — *G. Sowerby.* Conch. Man., fig. 62, 1843.
— — *Forb.* and *Hanl.* Hist. Brit. Moll., vol. ii, p. 98, pl. 36, figs. 8, 9, and pl. O, fig. 6, 1849.
Lutraria squamosa. *Gray.* Ann. of Philos., 1825.
— — *Hanley.* Recent Shells, vol. i, p. 28, Supp., pl. 9, fig. 47.
Lepton squameux. *Chenu.* Traité Elem., p. 47, fig. 148.

Spec. Char. Testâ ovato-trigonulâ, æquilaterali, compressâ, tenui; utroque latere rotundatâ, margine ventrali leviter arcuatâ; eleganter ornatâ; dente cardinali unico, dentibus lateralibus magnis.

Shell small, triangularly ovate, equilateral, thin, compressed; rounded on both sides, ventral margin slightly arched; elegantly ornamented externally; hinge with one small central tooth and two large lateral teeth.

Length, ¼ of an inch.

Locality. Cor. Crag, Sutton. Recent, British Seas.

One specimen only of this species was found by myself in the sandy portion of the Coralline Crag, at Sutton. The interior is sufficiently perfect for comparison, but the markings upon the exterior are rubbed and obliterated, and although there is some slight difference in the outline of our shell, there is every reason to believe it belongs to the same species as that now living in the British Seas, and to which I have assigned it. The hinge area is large, furnished with a small central tooth, and a double set, as it were, of lateral teeth, the innermost of which are large, diverging at an angle of about 90°, those placed outwardly are small and close to the dorsal margin, between these are deep depressions for the reception of the lateral teeth of the opposite valve. The dorsal margin is short, not extending beyond the lateral teeth, it then slopes to the sides which are both rounded, and the ventral margin is also slightly convex, differing thus a little in not presenting quite such a quadrate form as the recent shell; perhaps a larger number of individuals both recent and fossil would present a greater resemblance. The beautiful sculpture which ornaments the recent shell, is replaced in the fossil by a granulated surface, the effect of probably unequal erosion, and the semipellucid appearance is changed into an opaque one from the loss of its animal matter. Two ovate rather deeply impressed muscle marks are distinctly visible in my specimen, which measures barely a quarter of an inch in length, and a little less in height.

2. LEPTON DELTOIDEUM, *S. Wood.* Tab. XI, fig. 9, *a—d.*

KELLIA DELTOIDEA. . *S. Wood.* Catalogue, 1840.

Spec. Char. Testá subtriangulatá, vel deltoideá, æquilaterali, tumidá, politá, fragili; utrinque rotundatá, margine ventrali rectá; dentibus lateralibus approximatis.

Shell triangular or deltoidal, equilateral, tumid, glossy, and fragile; anterior and posterior sides rounded with the ventral margin straight, lateral teeth approximate.

Length, $\frac{1}{2}$ an inch. *Height,* $\frac{5}{16}$ths.

Locality. Cor. Crag, Sutton, Ramsholt.
Red Crag, Sutton.

This delicate and very elegant species is not particularly scarce in the Coralline Crag, where I have procured more than a couple of dozen specimens, and notwithstanding its extreme fragility, its presence in the Red Crag is also undoubted, two specimens belonging to that Formation are in my Cabinet, where they have been for many years, but their exact locality is uncertain, as the label has been unfortunately lost. We may fairly presume it to have prolonged its existence into the Period of the latter Deposit, as such delicate shells could only under very favorable protection have survived, being washed from an Older into a Newer Formation, and I give them without hesitation as natives of the Seas of that part of the world in both Periods.

I am not acquainted with any described species to which this can with certainty be assigned. *Bornia corbuloides*, Phil., En. Moll. Sic., vol. i, p. 14, t. 1, fig. 15, somewhat resembles it in outline, but the difference as given by the description appears to present characters sufficient to keep them distinct, being recorded to have its margin crenulated on both sides, which our shell certainly has not.

Lepton fabagella, Conrad, a very indifferent figure of which is given by Dekay, in the 'Nat. Hist. of New York,' a little resembles our shell in outline, and a fossil species by Conrad, *Lepton mactroides,* from the Upper Tertiaries of America, present general or generic resemblance, but the specimens must be examined for correct determination, and I have not been able to see any of the three species above referred to: our fossil must, therefore, for the present, remain with the name originally imposed in my Catalogue. The shell is very thin, and in the living state was no doubt nearly transparent, it has a prominent umbo, sloping towards each extremity, and is rounded there, while the ventral margin is quite straight, even inclining a little inwards in some specimens, and is deep or tumid, particularly at the upper part; the hinge is furnished with two teeth in each valve, diverging from the ligamental area, but do not extend far towards the sides, and in the left valve immediately beneath the umbo, and before the ligament, is a small cardinal tooth, but not one in the right valve; in perfect specimens the shell is beautifully glossy, and the exterior possesses a sort of irregular concentric striæ, which I imagine is not its original appearance, and that probably it was ornamented in its recent state with more elaborate sculpture.

3. Lepton depressum, *Nyst.* Tab. XI, fig. 6.

Cyclas? depressa. *Nyst.* Rech. Coq. Foss. d'Anv., p. 36, pl. 5, figs. 5, 6, 1836.
Erycina depressa. *Nyst.* Coq. Foss. de Belg., p. 88, pl. 4, fig. 5, *a*, *a*, *b*, *c*, *e*, 1844.

Spec. Char. *Testâ transversâ, ovatâ, inæquilaterali, depressâ, tenui; dente cardinali unico, dentibus lateralibus obtusis.*

Shell transversely ovate, slightly inequilateral, depressed and thin; hinge with one cardinal, and two obtuse lateral teeth.

Length, ¼ of an inch.

Locality. Cor. Crag, Sutton.

A single specimen of this shell in my Cabinet seems to correspond with what M. Nyst considers, probably with better materials than I possess, to be a distinct species, and the form certainly is different from that of any other already described; and as I am not imposing a new name, it will at least serve to call the attention of Collectors to its existence for better examination.

My specimen may be thus more particularly described. One side is rather broader or deeper than the other, the longer side being the more narrow, and slightly pointed, the hinge teeth are very obtuse, perhaps not quite perfect, dorsal area truncate, with a depressed umbo: lateral teeth not very distant, two ovate muscular impressions rather deep, and a continuous line formed by the mantle. The exterior is somewhat rough and eroded, but appears as if it once had a more regular ornament. M. Nyst says of his shell: "Transversim subtilissimè irregulariterque striatâ," and that it is in Belgium also a rare species.

4. Lepton nitidum, *Turton.* Tab. XI, fig. 7.

Lepton nitidum. *Turt.* Brit. Biv., p. 63, 1822.
— — *Flem.* Brit. An., p. 429, 1828.
— — *S. Wood.* Catalogue, 1840.
— — *Thorpe.* Brit. Mar. Conch., p. 49, 1844.
— — *Macgill.* Moll. Aberdeen, p. 278, 1843.
Kellia nitida. *Forb.* and *Hanl.* Hist. Brit. Moll., vol. ii, p. 92, pl. 36, figs. 3, 4, 1849.

Spec. Char. *Testá minutá, ovata, subinæquilaterali, compressá, tenui, fragili; dente cardinali unico; dentibus lateralibus magnis, distantibus.*

Shell small, ovate, nearly equilateral, compressed, very thin, and fragile; hinge with one cardinal tooth, and two large and distant lateral teeth.

Length, $\frac{1}{8}$th of an inch.

Locality. Cor. Crag, Sutton. Recent, British Seas.

When compiling my Catalogue, one specimen of a shell strongly resembling the description given by Turton as a distinct species of Lepton, was in my Cabinet, and I am sorry to say it is the only one I have as yet seen. As the authors of the 'Hist. of British Mollusca' confirm its existence in the recent state, and have given a good distinguishable figure, I am able with a little more confidence to describe my shell under the name originally given. My solitary specimen possesses characters more in accordance with the diagnosis of Lepton than of Kellia, as given by the proposer of the two Genera, both as regards the hinge as well as the shell. My specimen is, I suppose, the left valve having the cardinal tooth before the ligament, which is placed in a triangular fossette immediately within a slightly prominent umbo, two large lateral teeth extend to the edge of the dorsal area, and the two sides are a little unequal in size, the anterior being a trifle the larger, and the less rounded; the shell appears to have been very thin, and the impression of the muscles indistinct, while the exterior is somewhat rough and uneven, as if it had been altered by erosion.

Kellia,[*] *Turton*, 1822.

Amphidesma (sp.). *Lam.*, 1818.
Lasea. *Leach*, MS., 1819. *Brown*, 1827.
Erycina (sp.). *Desh.*, 1824.
Petricola (sp.). *Gray*, 1835.
Tellimya (sp.). *Brown*, 1827.
Cyladina. *Cantraine*, 1830.
Bornia. *Phil.*, 1836.
Aligena. *H. C. Lea*, 1843.
Scacchia (sp.). *Phil.*, 1844.
Myalina? *Conrad*, 1845.
Poronia. *Recluz.*, 1846.
Chironia. *Desh.*, sec. *Gray*.

Generic Character. Shell generally small and thin, equivalved, subequilateral, orbicular, spheroidal, ovate, or roundedly-oblong; tumid, or compressed; surface smooth, or covered with visible lines of growth. Hinge composed of two, sometimes only one, tooth in each valve, with a trigonal pit for the reception of the ligament, which is within the margin of the shell, though visible in some species when the valves are closed. Impressions by the adductor muscles suborbicular, often indistinct, that by the mantle without a sinus.

Animal of the form of the shell, with the edges of the mantle disconnected only in places, extending posteriorly into one short siphonal tube, and at the anterior side there is a prolonged canal with an opening for the protrusion of its foot, at the base of which is a byssal gland and groove.

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[*] Etym. Name commemorative of J. M. Kelly, Esq.

This genus was proposed by Dr. Turton for the reception of two small species of British shells, one of which had been previously placed in the genus *Mya*, and the other in that of *Cardium*.

The species known, belonging to this genus, are somewhat minute but elegant bivalves, which in the living state are usually found located either in rocks or seaweeds, though most of them are capable of spinning a byssus; they possess a considerable vertical range, some living near low water mark, while others inhabit the sea at the depth of 60 fathoms. They appear to have been somewhat largely developed in the Coralline Crag Period, and are invariably found free or loose in the sand, and if ever imbedded it must have been in the leaves or roots of seaweed, or in some material which by decomposition or disintegration has liberated them from their confined position. All my specimens were found in one locality, where there is a large accumulation of numerous small species. This genus has been obtained in considerable abundance from the Older Tertiaries of this country, and several species enrich the Cabinet of my friend F. E. Edwards, Esq. There has not been anything found in the secondary Formations that can with certainty be referred to this genus, although a shell in the Green-sand strongly resembles it.

One or two species from the Crag included under this generic title possess characters that will perhaps scarcely come within the range of our diagnosis. A considerable variation may be observed in their dental arrangement, some being furnished with two or more of these appendages, while others seem to be wholly deficient, an internal ligament placed in an oblique depression appears an universal character.

1. Kellia suborbicularis, *Montague*. Tab. XII, fig. 8, *a*, *b*.

Mya suborbicularis. *Mont.* Test. Brit., pp. 39, 564, t. 26, fig. 6, 1803.
— — *Mat.* and *Rack.* Linn. Trans., vol. viii, p. 41, 1807.
— — *Dillw.* Des. Cat. Rec. Shells, p. 55, 1817.
Tellina suborbicularis. *Turt.* Conch. Dict., p. 179, 1819.
Amphidesma physoides. *Lam.* Hist. des An. s. Vert., t. v, p. 493, 1818, fide *G. B. Sow.*
Kellia suborbicularis. *Turt.* Brit. Biv., p. 57, t. 11, figs. 5, 6, 1822.
— — *Flem.* Brit. An., p. 430, 1828.
— — *Macgill.* Moll. Aberd., p. 276, 1843.
— — *Thorpe.* Brit. Mar. Conch., p. 51, 1844.
— — *J. Sowerby.* Min. Conch., t. 637, fig. 1.
— — *Lovén.* Ind. Moll. Scand., p. 44, 1846.
— — *Alder.* Cat. Moll. North. and Durh., p. 93, 1848.
— — *Forb.* and *Hanl.* Hist. Brit. Moll., vol. ii, p. 87, pl. 18, fig. 9, *a*, *b*, and pl. O, fig. 4, 1849.
Kellia lactea? *Lovén.* Ind. Moll. Scand., p. 44, 1846.

TELLIMYA SUBORBICULARIS. *Brown.* Illust. Conch. Gr. Brit., pl. 14, figs. 14, 15, 1827.
TELLIMYA LACTEA? *Id.* - - - - pl. 14, figs. 10, 11.
— TENUIS. *Id.* - - - - pl. 14, figs. 12, 13.
— — *Smith.* Wern. Trans., vol. viii, p. 45, 1838.
BORNIA INFLATA. *Phil.* En. Moll. Sic., vol. i, p. 14, and vol. ii, p. 11.
ERYCINA PISUM. *Scacchi.* Catal., p. 6, figs. 1 and 2, 1836.

Spec. Char. Testá tumidá, orbiculato-oblongá vel suborbiculari, subæquilaterali, tenui, fragili; striis tenuibus incrementi distinctis; cardine bidentato, dentibus lateralibus remotis.

Shell tumid, roundedly-oblong or suborbicular, nearly equilateral, very thin and fragile; smooth or covered with very fine lines of growth; hinge with two cardinal teeth in one valve and one in the other, lateral teeth remote.

Diameter, $\frac{1}{4}$ of an inch.

Locality. Coralline Crag, Sutton.
Red Crag, Walton Naze.
Recent, Britain, Scandinavia, and Mediterranean.

The animal of this species, which may be considered the type of the genus, has been examined by Mr. Alder, and a description published in his valuable Catalogue of the 'Mollusca of the Coast of Northumberland' (page 94), where he has pointed out a remarkable deviation from the normal form of the *Bivalvia*, which in general have the siphonal tube or tubes, when they exist, placed at the posterior side of the shell, while in this one, in addition to a short siphon in its natural position, there is a large tube capable of being projected a considerable distance on the anterior side. The mantle has three openings, he says, one posteriorly for the usual siphon which scarcely projects beyond the margin of the shell; another in front in the form of a tube, which is protruded when the animal is in a state of activity, to a distance equalling the diameter of the shell; and the third is for the emission of a long subcylindrically-formed foot, at the base of which is a small opening and gland for the production of delicate threads or filaments, whereby the animal is enabled freely to suspend itself in the water to some foreign body although it is more often found located in the aperture of a rock.

A considerable degree of variation in form may be observed among the shells of this species in the recent state, but it is more particularly so with those which are found in the crevices of rocks, which probably in some measure distort or alter the otherwise natural form of the shell. This species is not by any means common in the Coralline Crag.

The more general form of my fossils is nearly orbicular, but one specimen (fig. 8, *b*) is more transverse, or has a greater diameter from the anterior to the posterior extremity: the same differences exist in those now found in our own seas. The Red Crag at Walton Naze has furnished me with one specimen. It is said to range from low-water mark to a depth of 60 fathoms.

2. **Kellia orbicularis**, *S. Wood.* Tab. XII, fig. 9, *a—c.*

Kellia? orbicularis. *S. Wood.* Catalogue, 1840.
— — *J. Sowerby.* Min. Conch., t. 637, fig. 2, *a.* 1844.

Spec. Char. Testâ minutâ, orbiculari, tumidâ, obliquâ, subæquilaterali, clausâ; concentricè et rugosè striatâ; latere postico breviore; dente cardinali unico in utraque valva ante foveam ligamenti; fovea triangulari, obliquâ, profundâ.

Shell small, orbicular, or spheroidal, inflated, subequilateral, closed; roughly striated concentrically; posterior side the shorter; one cardinal tooth in each valve before the ligament; ligamental pit oblique, deep, and of a triangular form.

Diameter, $\frac{1}{4}$ of an inch.

Locality. Cor. Crag, Sutton.

This is more abundant than the preceding species, and is limited, as far as I know, to one locality. I have not been able to trace it higher up in the Series, or nearer to our own time than the Cor. Crag. A shell called *Scacchia inversa*, (*Philippi*, En. Moll. Sic., vol. ii, p. 27, T. 14, f. 10,) resembles this in some respects, but differs in others, sufficiently, it is presumed, to be considered specifically distinct, depending upon the figure and description by Philippi.

The ligament is wholly internal, and the pit for its reception is an oblique, angular depression beneath or within the dorsal margin, extending backwards to some distance, with a ridge or ledge for its support. The umbo is prominent, and there is a considerable obliquity in the shell; an obtuse kind of ridge slopes from the umbo towards the anterior ventral margin, behind this the shell is a little flattened, giving a squarish outline by a somewhat straightened ventral margin. The left valve has the larger tooth, this is situated a little in advance, and not immediately beneath the umbo; the cardinal tooth of the right valve is placed further backward, and locks in behind the larger tooth of the opposite valve, making that tooth appear in some specimens to have a ledge, or another rudimentary one. In the figure of this species in Min. Conch., the teeth are represented as of equal size, but there is an evident inequality, neither are they both in the same position, there is no vestige of a tooth on the posterior margin, in which character it differs from any of the three figures given by Brown in his 'Illustrations of British Conchology.' Conrad, in his 'American Miocene Fossils,' figures and describes a similar species under the name of *Amphidesma æquata*, p. 65, Pl. 36, f. 5, but the figure is so inferior, and the description so brief, that it is impossible to institute a fair comparison.

3. **Kellia ambigua**, *Nyst.* Tab. XII, fig. 11, *a, b.*

Corbula ambigua. *Nyst.* and *West.* Nouv. Rech. Coq. Foss. d'Anv., p.6, pl. 3, fig. 4, 1839.
Erycina ambigua. *Nyst.* Coq. Foss. de Belg., p. 89, pl. 4, fig. 6, *a, b,* 1844.
— striatula. *Id.* - - - - p. 90, pl. 4, fig. 7, *b, c.*
Kellia dubia. *S. Wood.* Catalogue, 1840.
— — *J. Sow.* Min. Conch., t. 637, fig. 4, *a, b,* 1846.
— — *Tennant.* Strat. List. Brit. Foss., p. 15, 1847.

Spec. Char. Testâ transversâ, elongato-ovatâ, æquilaterali, leviter convexâ, lævigatâ, vel tenuissimè striatâ; utrinque rotundatâ, dente cardinali unico, obtuso; lateralibus nullis, foveâ ligamenti elongatâ obliquâ.

Shell transverse ovate, equilateral, slightly convex rounded at both extremities, smooth, or with very fine lines of growth; hinge with one cardinal tooth, no lateral teeth, ligamental area elongated, and oblique.

Length, $\frac{3}{4}$ths. *Height*, $\frac{7}{16}$ths. of an inch.

Locality. Coralline Crag, Sutton.
Red Crag, Walton Naze, and Sutton.
Mam. Crag, Chillesford.

This shell is abundant in the Coralline Crag, but the specimens are generally small, rarely exceeding half an inch. Fig. 11, *b*, is from the Red Crag, and measures at least three quarters of an inch. Among a large number of individuals a considerable variation may be observed, but these differences are principally in the proportional dimensions, although some specimens have occasionally a more triangular form (fig. 11, *a*). It is furnished with one somewhat prominent but obtuse tooth in the right valve, with a depression before it, and in the left valve there are two teeth, when perfect, which is not often the case, one immediately beneath the umbo, erect and compressed, the other decumbent along the margin and at right angles to the other; the ligamental area slopes obliquely backwards, forming a thickened ridge, against which it rested. The impressions by the adductors are large and rather elongated, while that formed by the edge of the mantle is at some distance within the margin of the shell, and is without any inflection, and in some thin specimens from the Coralline Crag, fine radiating lines are visible in the interior.

This is the largest species of Kellia that I am acquainted with, and strongly resembles in form a shell from the Paris basin, to which it was assigned in my Catalogue; but by a comparison with a specimen from the Older Tertiaries of this country, now in the cabinet of Mr. John D'Urban, and which probably is identical with the *Psammotea dubia*, Desh, a material difference is exhibited sufficient to prove them specifically distinct, as in that shell the ligament is placed on the outside, whereas in ours it is wholly internal.

A recent species from the Coast of Lower California, described and figured by Conrad in the 'Journal of the Acad. of Nat. Sci.,' Philadelphia, 1850, Art. xxii, p. 279, pl. 39, fig. 1, under the name of *Solecardia eburnea*, has a strong generic relationship with our Crag fossil, although no doubt specifically distinct.

4. **Kellia elliptica**, *Scacchi*. Tab. XII, fig. 13, *a—c*.

Tellina elliptica. *Scacchi.* Oss. Zool., ii, p. 14, 1833, } fide *Philippi*.
Loripes ellipticus. *Scacchi.* Ejusd. Cat., p. 5, fig. 1, } fide *Philippi*.
Lucina oblonga. *Phil.* En. Moll. Sic., vol. i, p. 34, t. 4, fig. 1, 1836.
Kellia flexuosa. *S. Wood.* Catalogue, 1840.
— — *J. Sowerby.* Min. Conch., t. 637, fig. 5, *a*, 1844.
Scacchia elliptica. *Phil.* En. Moll. Sic., vol. ii, p. 27, t. 14, fig. 8, 1844.

Spec. Char. Testâ transversâ, ovatâ vel ellipticâ; valdè inæquilâterali, convexâ, lævigatâ, politâ, tenui; anticè productâ, utrinque rotundatâ; margine dorsali flexuosâ; cardine valvulâ sinistrâ bidentato; dentibus lateralibus nullis.

Shell transverse, ovate or elliptical, convex; very inequilateral, smooth, glossy, and thin; anterior portion much the larger, and rounded at both extremities; dorsal margin sinuated; hinge with two cardinal teeth in left valve; no lateral teeth.

Length, $\frac{3}{16}$ths. *Height*, $\frac{1}{8}$th of an inch.

Locality. Coralline Crag, Sutton. Recent, Mediterranean.

A large number of this pretty little shell have been obtained at the rich Depôt of Molluscan remains at Sutton, where the two valves are occasionally, though rarely, found united.

The most distinguishing mark of this species is the peculiar sinuosity of the upper margin of the shell on each side of the umbo in both valves, but that in the right one is the most conspicuous; a sinus or rather an indentation at a considerable, but about an equal distance both before and behind the umbo, received the edge of the margin of the left valve by which it is a little twisted, thus interlocking and serving the office of lateral teeth. The hinge is furnished with one obtuse tooth in the right valve with a deep depression immediately before it; in the left valve are two teeth, one of which is somewhat prominent and compressed, the other placed at right angles to it and in a line with the margin; these two, when the valves are closed, occupy a position on each side of the single tooth of the right valve. The ligamental area is small and oblique, sloping towards the posterior side; the muscular impressions are large and distinct, and the mantle mark without any inflection.

I have not been able to compare my shell with the recent Mediterranean species, but from the peculiar character of a flexuous margin there cannot be much doubt of its identity; my specimens do not appear quite so large as the one represented by Philippi.

Scacchi's name is restored upon the authority of M. Philippi.

5. KELLIA CYCLADIA, *S. Wood.* Tab. XI, fig. 4, *a, b.*

KELLIA CYCLADIA. *S. Wood.* Catalogue, 1840.
— — *J. Sowerby.* Min. Conch., t. 637, fig. 6, *a*, 1844.
SCACCHIA OVATA? *Phil.* En. Moll. Sic., vol. ii, p. 27, t. 14, fig. 9, 1844.

Spec. Char. Testâ transversâ, obliquâ, tumidâ, ovato-trapezoideâ, valdè inæquilaterali, tenui, fragili; margine dorsali integerrimo; anticè majiore, posticè subrecto; dente cardinali unico, dentibus lateralibus nullis.

Shell transverse, oblique, tumid, of an ovate trapezoidal outline; very inequilateral, thin and fragile; dorsal margin without any inflection; anterior side the larger, posterior nearly straight; one cardinal tooth and no lateral teeth.

Length, $\frac{1}{4}$ of an inch nearly.

Locality. Coralline Crag, Sutton. Recent, Mediterranean.

Two or three specimens only of this delicate and fragile shell were all that I possessed when Mr. Sowerby figured and described it in 'Min. Conch.,' and I am sorry to say I have seen none in addition to that number. A recent shell from the Mediterranean above referred to, seems to correspond in most characters with our own, and I should imagine there was no doubt of the identity, but that the Crag shell is wholly destitute of lateral teeth, which M. Philippi describes as being distinct in his species. The hinge was probably furnished with one cardinal tooth in the right valve and two in the left, but in my specimens of both valves they are nearly obsolete. The recent shell was no doubt in a better state of preservation and more to be depended upon.

Its outward form and absence of all flexuosity in the margin will distinguish this from the preceding, which probably it resembled in its dentition. In the general form and fragile texture it much resembles one of the Freshwater Cyclades, whence its specific name.

Amphidesma equalis, Conrad, 'Amer. Mioc. Foss.,' p. 76, Pl. 43, fig. 9, in outward form is somewhat like our shell, but the figure, as with *A. æquata,* is not sufficient for comparison, and the description is too concise to supply the deficiency.

6. KELLIA COARCTATA, *S. Wood.* Tab. XII, fig. 10, *a, b.*

KELLIA COARCTATA. *S. Wood.* Catalogue, 1840.
GALEOMMA COMPRESSUM? *Phil.* En. Moll. Sic., vol. ii, p. 19, t. 14, fig. 5, 1844.

Spec. Char. Testá minutá transversá, oblongá, lævigatá, politá, compressá, subæquilaterali; anticè majiore, dente cardinali unico in utraque valvá, lateralibus nullis; margine ventrali recto, vel coarctato.

Shell small, transverse, oblong, smooth, and glossy, compressed nearly equilateral, anterior side the larger; hinge with one cardinal tooth in each valve, lateral teeth none, ventral margin straight, or subsinuated.

Length, $\frac{7}{32}$ds. *Height,* $\frac{1}{8}$th of an inch.

Locality. Coralline Crag, Sutton.

Two or three dozen specimens of this species are in my Cabinet, all from one locality. The form of the shell is somewhat oblong, rounded at the corners; the posterior side is not only the shorter, but is rather narrower; the dorsal margin of the anterior side being nearly straight, while the posterior has a gentle slope by which that side is a little diminished. The exterior in perfect specimens has a beautiful glossy appearance, and it was probably in the living state a semitransparent shell. There is one tooth in each valve, that in the right is the larger and more prominent, behind this is the ligament, placed on an oblong kind of shelf, inclining inwards on the posterior side, the edge of this shelf is in some individuals slightly elevated above the margin, and might be mistaken for another tooth; the lines of growth are occasionally visible but no regular striæ, and the impressions of the muscles are not distinguishable.

In dental characters and position of the ligament it corresponds with some of the other species included in this genus, and appears to be more closely allied to it, than to *Galeomma* in which Philippi has placed his shell, which is considered here with doubt as an identity.

One specimen of mine has the two valves united, but does not show an opening at the ventral margin, a character essential to that genus; there is a twist in the shell, and the single valve, when laid with its margin downwards, will not touch on all sides, and this bend in the opposite valve is in the contrary direction, so as to bring the margins of the two pieces together at all parts when the valves are closed; nevertheless there is something about it peculiar to itself as possibly not to belong to either this or to *Galeomma*.

7. Kellia pumila, *S. Wood.* Tab. XII, fig. 15, *a*, *b*.

Montacuta pumila. *S. Wood.* Catalogue, 1840.
Kellia pumila. *J. Sowerby.* Min. Conch., t. 637, fig. 3, 1846.

Testâ minimâ transversâ, ovatâ, obliquâ, tumidâ, valdè inæquilaterali, lævigatâ, politâ; anticè majiore et longiore, utrinque rotundatâ; dente cardinali unico, dentibus lateralibus magnis.

Shell small, transverse, ovate, oblique, tumid, very inequilateral, smooth, and glossy; anterior side much the larger and longer, both sides rounded; hinge with one cardinal tooth, and two lateral teeth.

Diameter, $\frac{1}{10}$th of an inch.

Locality. Cor. Crag, Sutton.

This is a very abundant shell at the above locality, where the two valves are often found united, their large and prominent teeth having kept them in their natural position.

Without allowing a latitude in variation beyond what we are accustomed to do, even with such variable species as were the inhabitants of the Crag Seas, this shell can scarcely be admitted as an identity with the *K. rubra*, although it bears a close approximation; and as the Malacologists have placed the recent shell in *Kellia*, it is thought best to follow their example, although it does not strictly accord in its dental characters with the diagnosis of that Genus.

Our shell is more inequilateral than *K. rubra*, and the hinge is quite at the side, the umbo being almost terminal, and the posterior lateral tooth then forms nearly a right angle with the beak and anterior lateral tooth: in the recent shell the hinge is much more central, with less of gloss upon the exterior; ours was perhaps a more transparent shell, with the teeth rather less distinct: thus differing more from the Mediterranean shell, according to Messrs. Forbes and Hanley, than from the British; there are two prominent lateral teeth, with a central one in the right valve, and two smaller nearly obsolete lateral teeth in the left valve.

Turton, in his 'British Bivalves,' p. 258, states the animal of this species to be viviparous, and that he found many specimens filled with perfectly formed young ones, similar in habit to the Genus *Cyclas*.

8. Kellia rubra, *Montague*. Tab. XI, fig. 10.

Cardium rubrum. *Mont.* Test. Brit., p. 83, t. 27, fig. 4, 1803.
— — *Mat.* and *Rack.* Linn. Trans., vol. viii, p. 66.
— — *W. Wood.* Ind. Test., p. 24, 1825.
Tellina rubra. *Turt.* Conch. Dict., p. 168.
Kellia rubra. *Turt.* Brit. Biv., pp. 57 & 258, pl. 11, figs. 7, 8, 1822.
— — *Flem.* Brit. An., p. 430, 1828.
— — *Gould.* Inv. Massach., p. 60, 1841.
— — *Thorpe.* Brit. Mar. Conch., p. 51, 1844.
— — *Alder.* Cat. Moll. North. and Durh., p. 94, 1848.
— — *Forb.* and *Hanl.* Hist. Brit. Moll., vol. ii, p. 94, pl. 36, figs. 5—7, and pl. O, fig. 3, 1849.
Lasæa rubra. *Brown.* Illust. Conch. Gr. Brit., pl. 20, figs. 18, 19, 1827.
Bornia seminulum. *Phil.* En. Moll. Sic., vol. i, p. 14, pl. 1, fig. 16.
— — *Desh.* Exped. Scient. Algerie. Moll., pl. 43, figs. 8—11, and pl. 43 A, figs. 6, 8.
Poronia rubra. *Recluz.* Rev. Cuv. Zool., p. 175, 1843.
— — *Hanley* in Brit. Mar. Conch. Syst. Ind., p. xxv, 1844.

Spec. Char. Testâ minutâ, ovatâ, tumidâ, subinæquilaterâli lævigatâ, utrinque rotundatâ, umbonibus prominulis.

Shell small, ovate, tumid, slightly inequilateral, smooth; both sides rounded, umbones rather prominent.

Diameter, $\frac{1}{10}$th of an inch.

Locality. Coralline Crag, Sutton.

Recent, Mediteranean, Britain, North America.

A single slightly injured specimen from the rich Depôt of small shells in the Coralline Crag at Sutton is all that I have been able to obtain; it seems to have the essential characters of the recent species, to which it is here referred, and as such is introduced as an identity, although a few more and better specimens would be desirable for confirmation: the character in which the preceding species seems most to differ from the recent shell, and upon which its specific separation was founded, is its being more inequilateral, and among all my numerous specimens there may be observed a very general uniformity in that respect. The specimen now under notice has the hinge more in the centre, placed as in the recent shell, the two lateral teeth forming a very obtuse angle with the umbo; they appear rather less in size than those of the British specimens, and these are said to be less developed than in the Mediterranean shell.

This is said by Mr. Clark (Mag. Nat. Hist., 1849,) to be the most terrestial of Bivalves, its habitat being generally in *Lichina pygmæa*, and that often from ten to twenty feet above the level of the highest spring-tides.

MONTACUTA. *Turton*, 1822.

LIGULA (sp.). *Mont.*, 1808.
PETRICOLA (sp.). *Gray*, 1825.
ERYCINA (sp.). *Desh.*, 1825 : (sp.) *Nyst*, 1844.
MESODESMA (sp.). *Lovén*, 1846.

Generic Character. Shell equivalve, inequilateral, transversely oblong, or obliquely ovate, generally small and thin: surface smooth, or concentrically striated, and occasionally with a few radiating ridges. Hinge with two diverging elongated teeth, more conspicuous in one valve than in the other. Ligament internal, placed in a triangular fossette: impression by the mantle without a sinus.

Animal oblong, having its mantle open in front, margins not fringed; without siphonal tubes (?); foot large and broad, furnished with a byssal groove.

The name of this Genus was proposed in honour of Montague, the author of 'Testacea Britannica;' it is not, however, well determined, as two or three species, the animals of which have undergone a careful examination, so far as their diminutive forms will permit, seem to present considerable differences, and as far as regards the shells alone, or their dental characters, the species here included would probably justify their being separated into different Genera. As the authors of the 'Hist. of Brit. Mollusca' have made the same observation, and have not ventured to propose a new Genus where the animals present characters so materially different, it would ill become the Palæontologist with only the shells to guide him, to venture upon such a step.

Shells apparently of this Genus, at least such as present similar dental characters, have been obtained from the Older Tertiaries of this country by Mr. Edwards; but nothing as yet known have been found in any Deposit of a more ancient date. Its Geographical range is at present limited to the European Seas and the Western Coast of America.

1. MONTACUTA BIDENTATA, *Montague*. Tab. XII, fig. 17, *a*, *b*.

MYA BIDENTATA. *Mont.* Test. Brit., p. 44, t. 26, fig. 5, 1803.
— — *Mat.* and *Rack.* Linn. Trans., vol. viii, p. 41, 1807.
— — *Turt.* Conch. Dict., p. 102, 1819.
MONTACUTA BIDENTATA. *Turt.* Brit. Biv., p. 60, 1822.
— — *Gould.* Inv. Massach., p. 59, 1841.
— — *Macgill.* Moll. Aberd., p. 302, 1843.
— — *Thorpe.* Brit. Mar. Conch., p. 52, fig. 58, 1844.
— — *Alder.* Cat. Moll. North. and Durh., p. 95, 1846.
— — *Forb.* and *Hanl.* Hist. Brit. Moll., vol. ii, p. 75, pl. 18, figs 6, 6*a*, 1849.
ANATINA BIDENTATA. *Brown.* Illust. Brit. Conch., pl. 11, figs. 8, 9, 1827.

TELLIMYA BIDENTATA. *Brown.* Ilust. Brit. Conch., 2d ed, p. 107, pl. 44, figs. 8, 9.
PETRICOLA — *Gray.* Ann. of Philos., 1825.
— — *Hanley.* Recent Shells, p. 54.
ERYCINA — *Recluz.* Rev. Zool., p. 331, 1844.
— FABA. *Nyst.* Coq. Foss. de Belg., p. 90, pl. 4, fig. 8, *a—d*, 1844.
MESODESMA EXIGUUM. *Lovén.* Ind. Moll. Scand., p. 42, 1846.

Spec. Char. Testâ minutâ, oblongo-ovatâ, inæquilaterali, lævigata, tenui; posticè abbreviatâ, obtusè angulatâ, anticè productâ, rotundatâ, vix attenuatâ, margine ventrali et dorsali leviter arcuatis; dentibus duobus in utraque valvâ; fovea ligamenti media subumbone demissa.

Shell small, oblong or ovate, inequilateral, smooth, thin; posterior side short, obtusely angulated, anterior produced and rounded, scarcely contracted; dorsal and ventral margins slightly curved; two teeth in each valve; a moderate sized cavity for the ligament deeply situated beneath the umbo.

Length, $\frac{5}{16}$ths of an inch. *Height,* $\frac{2}{3}$ds the length.

Locality. Cor. Crag, Sutton and Gedgrave.
Red Crag, Walton Naze.
Recent, Britain, Scandinavia, and North America.

Specimens of this species are by no means rare in the Coralline Crag, and I have found a few in the genuine Deposit of the Red Crag, at Walton Naze. Those from the latter or newer Formation correspond precisely with the recent shell from our own seas, and do not exceed it in size. The posterior side is considerably the shorter of the two, extending about one quarter the distance from the umbo that it does on the other side: the shell is smooth or very nearly so, and moderately tumid, the anterior or larger side forms half an ellipse, and the teeth are large and very distinct in the right valve, the one on the anterior side being the longer; those in the left valve are merely an angular elevation of the edge of the margin and inserted, when the valves are closed, into the depression between the teeth and margin of the right or opposite valve. The muscles are stated by M. Lovén to be large and powerful, but the impressions left by them in my specimens are very ill-defined, and by no means deeply seated.

In the recent state as a British species it is not very abundant, and is said by British Conchologists to be generally found burrowing in very thick valves of dead Oysters. I have never seen the fossil in such a situation.

2. MONTACUTA TRUNCATA, *S. Wood.* Tab. XII, fig. 16, *a*, *b*.

MONTACUTA TRUNCATA. *S. Wood.* Catalogue, 1840.

Spec. Char. Testâ valdè inæquilaterali, cuneiformi vel subrhomboideâ, compressâ, concentricè striatâ; posticè brevissimâ, angulatâ, anticè productâ, rotundatâ, attenuatâ; margine ventrali et dorsali rectiusculis; dentibus duobus divergentibus, in valvâ dextrâ majoribus, foveâ ligamenti parvâ.

Shell very inequilateral, subrhomboidal or slightly wedge-shaped, compressed or flattened, covered with concentric striæ; posterior side very short, angulated, anterior produced, slightly contracted, and rounded; ventral and dorsal margins nearly straight; two diverging teeth in each valve, much the larger in the right; a small triangular ligamental cavity placed immediately beneath the umbo.

Length, $\frac{3}{8}$ths. *Height*, $\frac{1}{4}$ of an inch.

Locality. Cor. Crag, Sutton.

This species is by no means scarce at Sutton, although valves of the above dimensions are not very often met with.

There are differences in this shell that seem to justify a removal from the preceding, although it must be confessed it is very nearly related, and in the immature state it is exceedingly difficult, if not impossible, to separate them, but what are considered to be the distinctive characters may be pointed out leaving to future observation to confirm or refute their identity.

In the recent species (*bidentata*), the shell is not only less in size but more tumid, and nearly smooth, our fossil is compressed, and the body of the shell much flattened, the posterior side is particularly short and truncate, sloping direct from the umbo. On the anterior side, which constitutes nine tenths of the shell, the dorsal and ventral margins are nearly straight but not quite parallel, the termination rounded and narrower, giving a somewhat cuneiform shape to the shell; the exterior is covered with regular and large concentric striæ or lines of growth, and the ventral portion of the shell is slightly compressed, with an imperfect angular ridge on the shorter side: the right valve has two large diverging teeth, the posterior one being the smaller; between these and immediately beneath the umbo is a small triangular cavity for the ligament. In the left valve, the margin is elevated into angular denticles which are inserted, when the valves are closed, between the margin and the teeth of the opposite valve. Muscular impressions not very distinct.

3. MONTACUTA SUBSTRIATA, *Montague*. Tab. XII, fig. 12, *a*, *b*.

LIGULA SUBSTRIATA. *Mont.* Test. Brit. Sup., p. 25, 1808.
MYA SUBSTRIATA. *Dillw.* Desc. Cat. Rec. Shells, p. 47, 1817.
— — *Turt.* Conch. Dict., p. 103, 1819.
— — *W. Wood.* Ind. Test., p. 11, No. 22, 1825.
MONTACUTA SUBSTRIATA. *Turt.* Brit. Biv., p. 59, t. 11, figs. 9, 10, 1822.
— — *Flem.* Brit. An., p. 465, 1828.
— — *S. Wood*, Catalogue, 1840.
— — *Macgill.* Moll. Aberd., p. 303, 1843.
— — *Lovén.* Ind. Moll. Scand., p. 43, 1846.
— — *Alder.* Cat. Moll. North. and Durh., p. 96, 1848.
— — *Forb.* and *Hanl.* Hist. Brit. Moll., vol. ii, p. 77, pl. 18, figs. 8, 8*a*, and pl. O, fig. 2, 1849.
TELLIMYA — *Brown.* Illust. Brit. Conch., pl. 16, fig. 23, 1827.
ERYCINA — *Recluz.* Rev. Zool., p. 330, 1844.
SPHÆNIA COSTULATA. *Macgill.* Moll. Aberd., p. 301, 1843, fide *Forb.* and *Hanl.*

Spec. Char. Testâ minutâ, transversâ, obliquâ, ovatâ, valdè inæquilaterali, convexâ, politâ, tenui, fragili; anticè productâ, utrinque rotundatâ; costatâ, costis acutis paucis; natibus prominulis; dente cardinali unico.

Shell small, transverse, oblique, ovate, very inequilateral, convex, glossy, thin and fragile; anterior much the larger, both sides rounded; ornamented with a few small sharp radiating ribs; umbones rather prominent; hinge with one tooth.

Length, $\frac{3}{16}$ths. *Height*, $\frac{1}{8}$th of an inch.

Locality. Cor. Crag, Sutton. Recent, Scandinavia and Britain.

This shell is by no means rare at the above locality. I have not yet seen it as a fossil in any Formation of a more recent date. It appears to resemble in every respect the living species, except perhaps it is a little larger. In order to institute a fair comparison it may be thus more fully described. The posterior side is very short and rounded, the anterior dorsal margin nearly straight, with a sharp and somewhat prominent umbo. The shell is glossy externally, covered with radiating distant striæ, or rather small angular ridges, which extend all over the shell, but are most prominent and conspicuous about the centre, and are more numerous on the older than on the younger part of the shell, that is, they do not all terminate, or rather, originate at the beaks; an intermediate ray is occasionally introduced on the body of the shell, but on the anterior slope ten or a dozen of these ridges are interposed between two which proceed direct from the umbo: hinge with a tooth in the right valve, placed in the direction of the dorsal margin anteriorly, having a depression on the upper side of it, and a similarly formed tooth, with a corresponding cavity in the opposite valve; ligamental pit moderately large, sloping obliquely beneath the posterior dorsal margin. In most of my specimens a slight depression is visible on the exterior, formed by the contraction of the ventral margin, probably the result of a protruded byssus.

It is considered in the recent state a deep-water animal, ranging from 10 to 140 Fathoms.

4. **MONTACUTA FERRUGINOSA**, *Montague*. Tab. XII, fig. 14, *a*, *b*.

MYA FERRUGINOSA. *Mont.* Test. Brit., Sup., pp. 22 & 166, t. 26, fig. 2, 1808.
MONTACUTA FERRUGINOSA. *Turt.* Brit. Biv., p. 60, 1822.
— — *Alder.* Cat. Moll. North. and Durh., p. 96, 1848.
— — *Forb.* and *Hanl.* Hist. Brit. Moll., vol. ii, p. 72, pl. 18, figs. 5, 5*a*, 5*b*, 1849.
— — *Alder.* Ann. and Mag. Nat. Hist., 2d Series, vol. v, p. 210, pl. 6, B, 1850.
— OBLONGA. *Turt.* Brit. Biv., p. 61, t. 11, figs. 11, 12, 1822.
— — *Flem.* Brit. An., p. 465, 1828.
— — *Thorpe.* Brit. Mar. Conch., p. 52, 1844.
— — *Macgill.* Moll. Aberd., p. 302, 1843.
— GLABRA. *Macgill.* Moll. Aberd., p. 303, 1843.
— — *Thorpe.* Brit. Mar. Conch., p. 245, 1844.

MONTACUTA FERRUGINEA. *Thorpe.* Brit. Mar. Conch., p. 52, fig. 16, 1844.
— OVATA. *S. Wood.* Catalogue, 1840.
— TENELLA? *Lovén.* Ind. Moll. Scand., p. 43, 1846.
TELLIMYA OVATA. *Brown.* Illust. Brit. Conch., pl. 14, figs. 20, 21, 1827.
— ELLIPTICA. *Id.* - - - pl. 14, figs. 17, 18, „
— GLABRA. *Id.* - - - 2d ed., p. 107, pl. 42, figs. 20, 21.
— OVATA. *Smith.* Mem. Wern. Soc., vol. viii, p. 41, 1838.
ERYCINA FERRUGINOSA. *Recluz.* Rev. Zool. Cuv., p. 332, 1844.

Spec. Char. Testâ transversâ, ellipticâ, convexâ, tenui, lævigatâ vel concentricè striatâ; anticè longiore, posticè subattenuatâ; margine dorsali et ventrali leviter arcuatis.

Shell transverse, elliptical, convex, thin, smooth, or striated concentrically, anterior side the longer, posterior slightly attenuated, dorsal and ventral margins gently curved.

Length, ½ an inch. *Height*, ¼ of an inch.

Locality. Cor. Crag, Sutton. Recent, Britain and Scandinavia.

This is not an abundant shell in my Cabinet, a few specimens however are sufficiently perfect to be fairly compared with the recent British shell, and I believe the differences are not more than may be considered as local variations.

Our shell is very transverse, having a length about twice that of its height, the anterior side occupying about three fifths of the entire shell; the posterior side is rather more pointed than in the recent specimens I have compared with, but in Messrs. Forbes and Hanley's description of the living species, it seems to have a considerable range in variation, occasionally resembling our own shell in that character, which appears to be its only difference: in perfect specimens the exterior is covered with regular concentric striæ, and the hinge is formed of an internal ligament of an angular form, deeply inserted, and sloping towards the posterior side; a portion of the ligament was probably seen externally, as a small sinus is formed in the umbo, through which it might have extruded, this pit, or support for the ligament is thickened at the edges, and elevated behind, so as to produce a sort of denticle in the left valve, and immediately before it is a distinct though not a prominent tooth, the same appearances are exhibited in the right valve, in which the tooth is rather more elevated. There are large adductor muscle marks of an ovate form, and the impression by the mantle is entire.

The animal of this species has been recently examined by Mr. Alder, who has published his observations in the 'Ann. and Mag. of Nat. Hist.' for the present year, where he has pointed out a peculiarity in the mantle on the anterior side, by which it appears, he says, to connect the open-lobed form in *Lepton* with the anterior tubular extension of that organ in *Kellia.*

Very extraordinary forms are assumed by the fleshy covering or mantle in many of the animals of this group, presenting us with distinctions so apparently anomalous as to entitle them, if distinguished by that organ alone, to be removed to very distant positions, but an evident relationship exists between their shelly exteriors, to separate which would be a violation to any natural arrangement.

5. MONTACUTA? DONACINA, *S. Wood.* Tab. XI, fig. 3, *a—c.*

MONTACUTA? DONACINA. *S. Wood.* Cat. of Crag Shells, Ann. and Mag. Nat. Hist., 1840.
— ? CYLINDRICA, var. *Id.*

Spec. Char. Testâ minutâ, transversâ, donaciformi, compressâ, valdè inæquilaterali, lævigatâ; posticè brevissimâ, margine dorsali rectiusculâ, margine ventrali convexiusculâ; cardine edentulâ? foveâ ligamenti profundâ, obliquâ.

Shell small, transverse, compressed, wedge-shaped, very inequilateral, smooth; posterior side very short, dorsal margin on the anterior side, nearly straight, ventral margin convex; hinge without teeth? ligamental area oblique and deep, inclining backwards.

Length, $\frac{1}{4}$. *Height*, $\frac{3}{16}$ths of an inch.

Var. cylindrica. Length, $\frac{1}{6}$th. *Height*, $\frac{1}{11}$th of an inch.

Locality. Cor. Crag, Sutton.

Three or four specimens only of this curious shell have been many years in my Cabinet, but nothing like it, either recent or fossil, has fallen under my observation, by which it can be even generically associated, although it appears very closely allied to this or to the Genus *Kellia.* My two forms therefore are placed here provisionally, with the best figures and descriptions their unfavorable condition will permit, in order to call the attention of future Collectors to their existence.

Figure (*b*) represents the left valve, which is very flat, and very inequilateral; the posterior side being rounded, and scarcely extending beyond the umbo; nearly the whole of the shell is on the anterior side, the dorsal margin of which is nearly straight, but sloping a little from the umbo, the ventral margin convex, becoming narrower at the anterior side, giving a wedge-shaped form to the outline of the shell by having a greater height from the ventral margin direct to the umbo; in the var. β. (fig. *a*) also a left valve, it is not so; the posterior side being there rounded, but not higher than any other part of the shell, and having such difference only in the outline, I imagine it to be merely a variation, as in all its other characters there is a specific resemblance. In an imperfect specimen of the right valve are two small prominences of the edge of the shell, one on each side of the ligamental area, scarcely deserving the designation of teeth, but perhaps a specimen in a better state of preservation might have them more developed. The ligament is wholly internal, placed immediately beneath the umbo in an angularly formed pit, inclining on the posterior side. The exterior is smooth and glossy, with the lines of growth scarcely visible.

CYAMIUM.* *Philippi*, 1845.

CYAMIUM? *Lovén*, 1846.
TURTONIA? *Hanley*, 1849.

Generic Character. Shell ovate, equivalve, inequilateral, closed, small, and thin: externally free from ornament. Hinge with two cardinal teeth. Palleal impression entire. Ligament internal.

This genus has been proposed for a species found in the Antarctic Seas, with an internal ligament, and was adopted by Dr. Lovén for the little shell called *Mya purpurea* by Montague, which has however been erected into a genus by the Authors of the 'Hist. of Brit. Moll.' under the name of *Turtonia*, in consequence of its having an external ligament.

CYAMIUM? EXIMIUM, *S. Wood.* Tab. XI, fig. 5, *a*, *b*.

Spec. Char. Testá minimá, ovatá, transversá, inæquilaterali, lævigatá, tenui; posticè longiore, utrinque rotundatá; cardine bidentato, uno laterali remoto ponè ligamentum; apicibus prominentibus.

Shell small, ovate, transverse, inequilateral, smooth and thin; posterior side the larger, both sides rounded. Hinge with two cardinal teeth, and one remote lateral tooth behind the ligament; umbones prominent.

Length, $\frac{1}{7}$th. *Height*, $\frac{1}{10}$th of an inch.

Locality. Coralline Crag, Sutton.

One specimen of a species that appears to possess characters most in accordance with the diagnosis of this Genus, is in my Cabinet, and I am induced to place it here provisionally until some more shall be found, either to establish its right to the position, or to remove it; the desire that everything found in the Crag should be brought under notice must be advanced as an apology for the introduction of some few imperfect materials here, as well as elsewhere, in this Monograph.

Our shell has an undoubted right to be specifically removed from *Mya purpurea, Mont.*, though in some of its characters there is a resemblance. The specimen figured is the left valve; it has two distinct, rather prominent, soft teeth close to the umbo on the anterior side of the ligament, one standing at right angles to the length of the shell, and the other, a larger one, diverging towards the anterior side, with a sufficient space between them for the insertion of a tooth which the opposite valve is supposed to possess: behind these teeth is a depression, where it is presumed the ligament was placed, and if it were so, it must have been wholly internal, and invisible when the valves were closed: behind this ligamental area is a large and somewhat prominent tooth, which may be called a posterior lateral tooth within the dorsal margin, and there is a depression outside of it, such as would receive a corresponding elevation on the edge of the right valve: the posterior side of the shell is the larger, the dorsal margin of which slopes with a gentle and elegant curve from a rather prominent umbo, having a rounded extremity, and a gentle convexity in the ventral margin: the anterior side slopes from the umbo with a straighter line, and is also rounded. The shell is very thin and fragile, and was probably, when living, a semi-transparent species. The muscle marks are wholly invisible.

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* Etym. Κυάμιον, a little bean.

Cryptodon.* *Turton*, 1822.

Thyasira. *Leach*, MS., 1818, fide *Lam.*
Thyatira. *Id.* MS., 1819, fide *Jeffreys.*
Thiatisa. *Id.* MS., 1819, fide *Gray.*
Bequania. *Id.* MS., fide *Brown.*
Venus (sp.). *Don.*, 1801.

Tellina (sp.). *Mont.*, 1803.
Axinus. *J. Sowerby*, 1821.
— *Lovén*, 1846.
Ptychina. *Phil.*, 1836.
Thiatyra. *G. B. Sow., Jr.*, 1842.

Generic Character. Shell equivalved, subequilateral, tumid, thin, subhyaline, and closed: hinge with a single obtuse, or somewhat obscure tooth in each valve; no lateral teeth. Ligament semi-internal, placed in a linear depression beneath the dorsal margin: impressions of the adductor muscles indistinct, that by the mantle without a sinus.

Animal with an open mantle, but no prolonged siphons, foot long, subcylindrical, and tubular, with a clavate extremity.

The Authors of the 'Hist. of Brit. Moll.' have included this in the Genus *Lucina*, but the animal of the one species that has been examined, appears to present differences sufficient to entitle it to Generic distinction, and the characters of the shell are so decidedly dissimilar, that a separation seems to be required.

There are several claimants for the honour of distinguishing this as a Genus, and the strict right of priority is somewhat difficult to determine. Leach, in his indiscriminate establishment of Genera, proposed several names, some of which were put in print, and he may perhaps be the one most justly entitled. The name by Sowerby has scarcely a better claim, as merely the exterior of the shell has been observed, and the position of the ligament not clearly indicated, as Turton is next in chronological order, his name is here employed.

Species strictly belonging to this genus have not been described from any Formation of an older date than the Tertiaries, the shell called *Axinus obscurus*, from the Magnesian Limestone, belongs to a different group, and has already been made a genus of by Professor King, under the name of *Schizodus*.

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* Etym. Κρύπτω, hidden, ὀδούς, a tooth.

1. Cryptodon sinuosum, *Donovan.* Tab. XII, fig. 20, *a*, *b*.

Venus sinuosa. *Don.* Brit. Shells, t. 42, fig. 2, 1801.
Tellina flexuosa. *Mont.* Test. Brit., p. 72, 1803.
— — *Mat.* and *Rack.* Linn. Trans., vol. viii, p. 56, 1807.
— — *Turt.* Conch. Dict., p. 177, 1819.
— — *W. Wood.* Ind. Test., p. 22, pl. 4, fig. 78, 1825.
Amphidesma flexuosa. *Lam.* Hist. Nat. des An. s. Vert., t. v, p. 492, 1818.
Thyasira flexuosa. "*Leach*, MS.," *Lam.* Loc. cit. Sup., t. v, p. 492, 1818.
Lucina sinuata. *Lam.* Loc. cit., t. v, p. 543, 1818.
— — *Brown.* Illust. Brit. Conch., pl. 17, figs. 4, 6, 1827.
— sinuosa. *Forbes.* Report on Ægean Invert., p. 182, 1843.
— — *Thorpe.* Brit. Mar. Conch., p. 74, 1844.
— flexuosa. *Flem.* Brit. Ann., p. 442, 1828.
— — *Gould.* Invert. Massach., p. 71, fig. 52, 1841.
— — *Forb.* and *Hanl.* Hist. Brit. Moll., vol. ii, p. 54, pl. 35, fig. 4, 1849.
— — *Reeve.* Conch. Icon. Lucina, pl. xi, fig. 62.
— Sarsii. *Id.* - - - pl. ix, fig. 52.
— Goodhalli. *J. Sow.* Geol. Trans., 2d Ser., vol. v, pl. 8, fig. 7, 1834.
Cryptodon flexuosum. *Turt.* Brit. Biv., p. 121, pl. 7, figs. 9, 10, 1822.
— — *Brown.* Illust. Brit. Conch., 2d ed., pl. 39, figs. 4, 5.
— — *Möller.* Ind. Moll. Groenl., p. 20, 1842.
— — *Alder.* Cat. Moll. North. and Durh., p. 91, 1847.
— bisinuatum. *S. Wood.* Catalogue, 1840.
Ptychina biplicata. *Phil.* En. Moll. Sic., vol. i, p. 15, t. 2, fig. 4, 1836.
Axinus unicarinatus. *Nyst.* Rech. Coq. Foss. d'Anv., p. 6, pl. 1, fig. 22, 1835.
— Benedenii. *De Koninck.* Des. Coq. Foss. Arg. Boom, p. 35, pl. 11, figs. 2, 3, 1837.
— angulatus. *Nyst* (not *Sowerby*). Coq. Foss. de Belg., p. 141, pl. 6, fig. 13, 1844.
— — *Michel.* Desc. des Terr. Mioc. de l'Ital. Septen. (Haarlem Trans.), p. 118, pl. 4, figs. 23, 23*, 1847.
— flexuosus. *Lovén.* Ind. Moll. Scand., p. 38, 1846.
— Sarsii. *Id.* - - - p. 38, „

Spec. Char. Testâ ovato-orbiculari vel subhexagonâ, lævigatâ, tenui, subpellucidâ, tumidâ, subæquilaterâ; latere postico biplicato, margine ventrali producto, lunulâ cordato-ovatâ, magnâ, impressâ.

Shell ovately orbicular, with an irregularly hexagonal outline, smooth, thin and subpellucid, tumid, and nearly equilateral; posterior side with two folds or furrows, ventral margin produced, and a large and deeply impressed heart-shaped lunule.

Diameter, $\frac{1}{2}$ an inch.

Locality. Cor. Crag, Sutton.

Recent, Ægean Sea, Britain, Scandinavia, and North America.

This species is not at all abundant. There is no doubt of its identity with the recent British shell, and I have given it as an inhabitant of the North West Coast of America, upon the authority of that accurate observer, Dr. Gould. A specimen obligingly presented to me by Professor E. Forbes, obtained by him in the Ægean Sea, does not offer the slightest difference that could be considered as specific.

The recent shell is nearly transparent in its young state, becoming a little thickened when full grown, and then only the true form of the muscular impressions can be observed, that upon the anterior side is somewhat elongated, and within the mantle mark, but has not the band-like form of the true *Lucina:* the exterior is smooth, with the exception of rather rough lines of growth, and in the centre of the shell there is somewhat of a flattened space, which gives one side of a hexagon to the ventral margin, there are two distinct depressions or sinuses on the posterior side, and the dorsal margin of the shell is produced so as almost to cover over the ligament, which might otherwise be called external, as it acts over a small fulcrum, and opens the valve by its contraction; there is one obtuse tooth in the right valve at the anterior termination, or rather commencement of the ligament, with a corresponding depression in the left valve, and the umbo curves a little towards the anterior, over its large and deep lunule.

Axinus angulatus of 'Min. Conch.' T. 315, is decidedly different, but the older Tertiary shell "*Lucina Goodhallii*" from Hampstead, appears so strongly to resemble our species, that I cannot consider their trifling differences to be more than the result of locality, or of other conditions, and in examining many specimens of this shell in the rich Cabinets of my friends, Messrs. Edwards and Wetherell, I could come to no other conclusion, though all the specimens yet obtained have the two valves so closely united, that their external characters alone are visible. The principal difference appears to be in a rather more rounded outline to the older shell, which has also less deeply produced folds or sinuses on the posterior side, but in the examination of a specimen from Boom, in the Cabinet of Sir Charles Lyell, these posterior sinuses were more strongly marked than in our Crag shell, with a rather larger and deeper lunule, while the specimen itself exceeded in magnitude any of my own, and judging from the figure and description of the Scandinavian shell *Axinus Sarsii*, Lovén, it does not appear to vary sufficiently to be considered specifically distinct.

It is quoted by Nyst as a fossil from Bordeaux.

2. **Cryptodon ferruginosum**, *Forbes.* Tab. XII, fig. 19, *a*, *b*.

Cryptodon rotundatum. *S. Wood.* Catalogue, 1840.
Kellia ferruginosa. *Forbes.* Ægean Invert. Rep. Brit. Assoc., p. 192, 1843.
Artemis ? — *Jeffreys.* Ann. Nat. Hist., vol. xix, p. 313.
Clausina — *Id.* - - - vol. xx, p. 18.
— abyssicola. *Id.* - - - - p. 18.
— Croulinensis. *Id.* - - - - p. 19.
Lucina ferruginosa. *Forb.* and *Hanl.* Hist. Brit. Moll., vol. ii, p. 60, pl. 34, fig. 1, 1849.

Spec. Char. Testá minimá, rotundato-ovatá, obliquá, subæquilaterali, tumidá, lævigatá, tenui, fragili; latere postico obsoletè uniplicato; dente cardinali unico, obtuso.

Shell small, roundedly ovate, oblique, subequilateral, tumid, smooth, thin, and fragile; posterior side with one obsolete fold or furrow, one obtuse cardinal tooth.

Diameter, $\frac{1}{8}$th of an inch.

Locality. Coralline Crag, Sutton. Recent, North Britain, and Ægean Sea.

This is not an abundant fossil, and I have only met with it in the rich Depôt at Sutton.

When my Catalogue was compiled this species had not been recognised in the recent state, and the name then proposed for it being without description, or anything by which it could be identified, must give way to the subsequent one of Professor Forbes. In comparing our fossil with the specimens now obtained in the British Seas, no essential difference can be detected, and there is little doubt of their identity, and when it is considered that the recent shell has been separated into three distinct species, more than ordinary range in variation may be expected; the fossil is, however, free from the ferruginous covering which obscures some of the characters of the living shell; the Authors of the 'Hist. of Brit. Moll.' after uniting the three species of Mr. Jeffreys, describe their shell as entirely without a fold, but in the most perfect specimens of our fossil may be seen an obscure inflection upon the posterior side, which is here considered to constitute one of its most determinable characters, and has always been in my Cabinet under the MS. name of *Cryptodon*, from that resemblance. In the few specimens that I possess no great variation is observable; the general form is obliquely orbicular, the diameter rather greater when measuring from the umbo to the ventral margin than from the anterior to the posterior side, and in some specimens the outline shows a decided pentangular form. There is one obscure tooth in each valve, like that in the preceding species, and the ligament is placed in a depression beneath the dorsal margin, so that it must have been nearly hidden when the valves were united; the anterior muscle mark is large, and of an ovate form, and not band-like as in *Lucina*. This shell has much the aspect of *Kellia*, and might, without much violence to classical arrangement, be placed there, or at least, judging from the characters of the shell alone, it appears to have a nearer relationship to that genus than to *Lucina*. In the living state it has only been met with as a deep-water shell, both from the Ægean and the North British Seas, ranging from 20 to 100 fathoms.

LORIPES,* *Poli*, 1791.

LORIPES—LORIPODERMA. *Poli.*
TELLINA (sp.). *Linn.*
AMPHIDESMA (sp.). *Lam.*, 1818.
THIATISA (sp.). *Leach*, 1819, } fide *Gray*.
LIGULA. *Menke*, 1830, } fide *Gray*.
UNGULINA. *Bosc.*, 1802.
TARAS? *Risso.*, 1826.

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* Etym. *Lorum*, a strap, and *pes*, a foot.

Generic Character.—Shell orbicular, subequilateral, equivalve, lenticular; smooth or striated externally. Hinge with one or two cardinal and two lateral teeth; the latter sometimes obsolete. Muscular impressions unequal, anterior one the longer, mantle mark without a sinus. Ligament internal.

Animal of the form of the shell, mantle open in front, with the margins crenulated; foot subcylindrical, crooked, club-shaped at the extremity, one siphon.

Although the animal is closely allied to *Lucina,* it appears to be entitled to generic distinction, on account of the difference of position in regard to the ligament, being wholly internal, whereas in the other it is placed externally upon a ledge or fulcrum; the reported difference in the siphonal opening is also an additional reason for the separation.

This is a recent genus, and its age, as far as it is known to me, does not extend beyond the Middle Tertiaries.

1. **Loripes divaricata,** *Linnæus.* Tab. XII, fig. 4 *a, b.*

Tellina divaricata. *Linn.* Syst. Nat., ed. 12, p. 1120, No. 70, 1767.
— — ? *W. Wood.* Ind. Test., p. 23, pl. 4, fig. 87, 1825.
— digitaria. *Poli.* Test. utri. Sic., vol. i, p. 47, t. 15, fig. 15, 1791.
Cardium arcuatum. *Mont.* Test. Brit., p. 85, pl. 3, fig. 2, 1803.
— — *Mat.* and *Rack.* Linn. Trans., vol. viii, p. 67, 1807.
Lucina arcuata. *Flem.* Brit. An., p. 442, 1828.
— — *Reeve.* Conch. Icon. Lucina, pl. 11, fig. 61.
— divaricata. *Woodward.* Geol. of Norf., p. 43 (not reference).
— — *Galeotti.* Mém. de l'Acad. Roy. de Brux., t. xii, p. 157, No. 137, pl. 3, fig. 18, 1835.
— — *Forb.* and *Hanl.* Hist. Brit. Moll., vol. ii, p. 52, pl. 35, fig. 3, 1849.
— trifaria. *Krynecki.* Bull. des Nat. de Mosc., p. 62, No. 11, 1837. Sec. *Midd.*
— commutata. *Phil.* En. Moll. Sic., vol. i, p. 32, t. 3, fig. 15, 1836.
— — *Forbes.* Rep. Ægean Invert., p. 182, 1843.
— — *Middendorff.* Malacozool. Ross., p. 566, (Mém. de l'Acad. des Sci. de St. Petersb., 1849.)
— N. S. *allied to* divaricata. *G. Sow.* and *S. Wood.* Mag. Nat. Hist., vol. iii, p. 325, 1839.
Loripes undularia. *S. Wood.* Catalogue, 1840.

Spec. Char. Testâ orbiculari, subæquilaterali, convexâ, bifariam oblique striatâ, divaricatâ, cardine dentibus lateralibus munito; margine minutissmè crenulatâ.

Shell orbicular, nearly equilateral, ornamented with oblique divaricating striæ; hinge furnished with lateral teeth, and the margin very finely crenulated.

Diameter, ½ an inch nearly.

Locality. Red Crag, Sutton.
Mam. Crag, Bramerton. Recent, Mediterranean, Britain.

This species appears first in the Red Crag, where it is very scarce, but I believe it is rather more plentiful in the Mam. Crag, though not very abundant there: as a recent British shell it is one of our rarest species. In a comparison with Montague's specimen, now in the British Museum, I was not able to detect the slightest difference.

Our shell may be further described as very nearly orbicular, though in some specimens, from a slight prominence of the umbo, the diameter is rather greater in height: the hinge is furnished with one rather obtuse and angular tooth in the right valve, and two lateral teeth, the posterior one is the more distant; in the left valve are two diverging cardinal teeth, with two lateral indentations corresponding to the teeth of the opposite valve, and the ligament is placed behind the cardinal teeth in an oblique fossette: the adductor muscle marks are slightly unequal: the anterior one is somewhat elongated, but it has not the band-like form of the true *Lucina:* that by the mantle is quite entire: the interior is often furnished with numerous radiating striæ, and the margin in very perfect specimens is finely crenulated. The exterior is ornamented with diverging or divaricating striæ, or rather ledges varying from 25 to 30, they are slightly undulatory and have the ledge or elevated part on the upper side or towards the umbo, and are crossed by the lines of growth: the divergence is from an imaginary line a little on the anterior side, at an angle generally of about 100°.

This is the only species with these peculiar markings that I have seen: the shell from the Older Tertiaries, which is abundant in the Hordwell Cliff, has the ligament placed wholly externally upon a projecting fulcrum, and the species from Bordeaux, with the same specific name, differs in the like character, as also do the West Indian shells.

There are, probably, several species possessing these diverging and curving radiations, all of which have been united under the name of *divaricata*, and a long extension of Geological Age, as well as a wide Geographical distribution, have been given in consequence. The common West India shell, and the Older Tertiary fossils, also belong to the true *Lucina*.

LUCINA,* *Bruguière*, 1792.

VENUS (sp.). *Linn.*
TELLINA (sp.). *Mont.*, 1803.
CYRACHÆA. *Leach*, MS., 1819, fide *Gray*.
MYRTEA. *Turt.*, 1822.
PHACOIDES. *Blainv.*, 1825.
ORTYGIA (sp.). *Brown*, 1827.

Generic Character. Shell equivalve, generally equilateral, lenticular, compressed, occasionally tumid; surface more or less ornamented with concentric striæ or elevated ridges, sometimes with radiating striæ or costæ. Hinge usually with two diverging cardinal teeth in each valve, and two lateral teeth, which in some species become obsolete: anterior muscular impression of a ligulate or elongated form. Palleal impression without a sinus. Ligament external.

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* Etym. A Proper Name.

The animal of this genus is described as having its mantle open in front, and fimbriated edges; very short siphonal tubes, with a long cylindrically-formed foot.

The genus as here restricted is intended to include all those species which have an external ligament, of which the *Venus borealis* of Linnæus may be considered the type. This appears to form a distinct group, characterised by a differently formed anterior muscle, which the mantle seems to envelope, and the impression is isolated within: the edge of the mantle extending up to the anterior part of the adductor, and not on the posterior edge where the line of the mantle mark, in most of the *Dimyaria*, connects the two muscles.

1. Lucina borealis, *Linnæus*. Tab. XII, fig. 1 *a*, *b*.

Venus borealis. *Linn.* Syst. Nat., ed. 12, p. 1134, No. 143, 1767.
— — *Don.* Brit. Shells, vol. iv, t. 130, 1803.
— exoleta æquilatera. *Chem.* Conch. Cab., t. vii, p. 22, t. 38, fig. 406, 1784.
— spuria. *Gmel.* Syst. Nat., p. 3284, No. 72, 1788.
— — *Dillw.* Desc. Cat. Rec. Shells, p. 194, 1817.
— circinata? *Broc.* Conch. Foss. Subap., p. 552, t. 14, fig. 6, 1814.
Tellina radula. *Mont.* Test. Brit., p. 68, 1803.
— — *W. Wood.* Ind. Test., p. 21, pl. 4, fig. 71, 1825.
Lucina radula. *Turt.* Brit. Biv., p. 116, 1822.
— — *Phil.* En. Moll. Sic., p. 35, t. 3, fig. 17, 1836.
— — *Gould.* Invert. Massach., p. 69, 1841.
— — *Macgill.* Moll. Aberd., p. 255, 1843.
— — *Dekay.* Nat. Hist. New York Zool., pl. 26, fig. 274, 1843.
— alba. *Turt.* Brit. Biv., p. 114, t. 7, figs. 6, 7, 1822.
— antiquata. *J. Sow.* Min. Conch., t. 557, fig. 2, 1827.
— — *Woodward.* Geol. of Norf., p. 43, 1833.
— — *Nyst.* Coq. Foss. de Belg., p. 128, pl. 6, fig. 7, *a*, *b*, 1844.
— contracta? *Say.* Journ. Acad. Nat. Sc., vol. iv, p. 145, pl. 10, fig. 8.
— — ? *Conrad.* Am. Mioc. Foss., p. 40, pl. 20, fig. 5, 1838.
— flandrica. *Nyst.* Coq. Foss. de Belg., p. 127, pl. 6, fig. 6, *a*, *b*, 1844.
— borealis. *Lovén.* Ind. Moll. Scand., p. 38, 1846.
— *Alder.* Cat. Moll. North. and Durh., p. 91, 1848.
— — *Forb.* and *Hanl.* Hist. Brit. Moll., vol. ii, p. 46, pl. 35, fig. 5, and pl. M, fig. 6, 1849.
— mitis. *Woodward* (not *Sow.*). Geol. of Norf., p. 43, 1833.

Spec. Char. Testá orbiculari, lenticulari, compressiusculá; striis concentricis numerosis, erectis, approximatis vel distantibus; anticè rotundatá, posticè subquadratá, lunulá lanceolatá, cardine bidentato.

Shell orbicular, lenticular, somewhat compressed, covered with numerous concentric, erect striæ or ridges, close or distant; anterior side rounded, posterior of a squarish outline, lunule small, elongate, hinge with two cardinal teeth.

Diameter, $1\frac{7}{8}$ths of an inch.

Locality. Cor. Crag, Sutton, Ramsholt, Sudbourn, and Gedgrave.
Red Crag, Passim.
Mam. Crag, Postwick and Thorpe.
Recent, Mediterranean, Britain, Scandinavia, and North America.

This is one of our most abundant shells in the Coralline as well as in the Red Crag.

In the young state, it is rather less equilateral than in the adult, and has comparatively a larger and deeper lunule, with the teeth more distinct and prominent. It is nearly orbicular, though sometimes there is a trifling difference in the dimensions, the diameter from the anterior to the posterior side exceeding that from the umbo to the ventral margin, and *vice versâ.* In the right valve are two cardinal teeth, one large and bifid, the other small and simple, with a prominent lateral tooth on the anterior side, and in the left are also two cardinal teeth, one simple and the other bifid, but their positions are reversed, the bifid one in the left being the anterior, with a corresponding lateral tooth on that side. The interior is often strongly marked with radiating striæ, most distinct beyond the edge of the mantle mark : there are two deep impressions by the adductor muscles, the posterior of an ovate form, the anterior one is much elongated, being as it were bipartite, that nearest the anterior lateral tooth of the usual form, with a ligulate prolongation down to near the middle of the shell; in addition to which, in the interior about the centre is a banded impression extending half way across the shell, in a direction at right angles to the ligamental fulcrum, as if the mantle had there a division. In some specimens, the exterior is covered with close-set lamellated striæ, and the shell is somewhat tumid, while in others the shell is flat or much compressed, and the concentric markings distant. A little inflection is always to be seen on the posterior side, producing a more or less distinctly marked sinus, and both sides are generally a little elevated, giving the shell the appearance of being high-shouldered. A small but distinct lunule is visible, curving strongly near the umbo, which gives to the young shell a comparatively larger mark there than when it is full grown. This shell is said in the recent state to have a range from low water-mark to the depth of 90 fathoms.

2. **Lucina crenulata**, *S. Wood.* Tab. XII, fig. 7 *a, b.*

Lucina crenulata. *S. Wood.* Catalogue, 1840.
— striatula? *Nyst.* Rech. Coq. Foss. de Hoesselt et Kl. Sp., p. 5, No. 11, pl. 1, fig. 11, 1836.
— — ? *Nyst.* Coq. Foss. Belg., p. 131, pl. 6, fig. 9, *a—c*, 1844.
— dentata? *Goldf.* Pet. Germ., vol. ii, p. 230, t. 147, fig. 1.
— crenulata. *Conrad.* Amer. Mioc. Foss., p. 39, pl. 20, fig. 2.

Spec. Char. Testâ parvâ orbiculari, æquilaterali, convexâ, concentricè striatâ, striis numerosis confertis, lunulâ impressâ, elongato-ovatâ; dentibus lateralibus distinctis; margine crenulatâ.

Shell small orbicular, equilateral, convex, concentrically striated, striæ close-set, and numerous; an ovate impressed lunule; lateral teeth distinct; margin crenulated.

Diameter, $\frac{1}{4}$ of an inch.

Locality. Coralline Crag, Sutton.

This species is exceedingly abundant, but restricted, as far as I have seen, to one locality, where, from the prominence of the lateral teeth, the valves are sometimes found united.

Our shell is furnished with one cardinal, obtuse, triangularly formed tooth in the right valve, and a distinct and distant lateral tooth on each side: in the left valve are two cardinal diverging teeth, with a triangular space between them, also two lateral teeth: anterior muscle mark large, but not very narrow. The striæ upon the exterior are rounded, and about as broad as the spaces between them, and the posterior side is marked with an obscure ridge, produced by a slight inflection of the margin on that side, and at the ridge the striæ often bifurcate, being less numerous upon the inflected portion.

A shell in my Cabinet from Bordeaux, which I presume to be *Lucina dentata*, Bast., appears to differ from the Crag shell in several characters, it is more tumid, rather wider in a contrary direction to our shell, and is more finely striated externally, and has not so distinct a ridge on the posterior side; the anterior tooth is the more prominent in our shell, and the inside has fine radiating striæ, which I do not observe in Basterot's species; in ours the ligament is wholly external, placed on a prominent fulcrum; in the Bordeaux shell it is internal, placed obliquely beneath the umbo, and if I am right in the species, belongs to the genus *Loripes*.

Lucina striatula, Nyst, may possibly be the same as our shell, though it is distinctly stated by that author to have the margin free from crenulations, but, judging from the locality, his shell may perhaps belong to the older or Bordeaux species.

From the description and figure of the American fossil by Conrad, I presume his shell to be the same species. We have seen the preceding (*borealis*) to have a range from the Mediterranean to the Coast of the United States, and there is great probability that the fossil from the Upper Tertiaries of that side of the Atlantic is identical with our own; it is somewhat singular the author should have chosen for his shell the same name under which the Crag species had passed in my Catalogue, and the coincidence is perhaps the more remarkable, the American fossil having been obtained from Suffolk, in Virginia.

3. Lucina decorata, *S. Wood.* Tab. XII, fig. 6 *a*, *b*.

Lucina squamosa? *Goldf.* Pet. Germ., vol. ii, p. 230, t. 147, fig. 3, *a*, *b*.

Spec. Char. Testâ transversâ, ovatâ, inæquilaterali, crassâ, striis radiantibus, et decussantibus ornatâ; lunulâ magnâ, lanceolatâ; cardine unidentato, dentibus lateralibus perspicuis: umbonibus prominentibus.

Shell transverse, ovate, inequilateral, thick, and strong; ornamented with radiating striæ, decussated by concentric ridges; a large elongated lunule; hinge with one cardinal tooth and two lateral teeth in each valve: umbones prominent.

Length, $\frac{1}{4}$ of an inch. *Height*, $\frac{3}{16}$ths of an inch.

Locality. Cor. Crag, Sutton.

This is by no means an abundant shell, and the above dimensions are to the full amount of my largest specimen.

It is a pretty species, covered externally with large obtuse rays, or depressed ribs, they are but few in number in the young state, increasing as the shell enlarges by the introduction of an intermediate ray, sometimes diverging in pairs; they are crossed by large obtuse ridges, or thickened lines of growth, placed sometimes in pairs, generally more irregular; the shell is nearly oval, but the anterior side is much the larger of the two, the umbo is elevated, and immediately beneath it is one triangular, sub-bifid tooth in the right valve, with two distinct, nearly equidistant lateral teeth, and in the left valve are two, diverging on each side of the triangular space, for the reception of the one of the right valve, with two lateral teeth: the rays are visible within the shell, and the muscle marks are not very deeply seated: the anterior one is elongated, though not strictly of that ligulate or tongue-shaped form so characteristic of the true *Lucina*. *Tellina reticulata,* Poli. (*Lucina pecten,* Phil., 'En Moll. Sic.,' p. 31, T. 3, fig. 14), slightly resembles our shell, but it has finer and more numerous rays, and is more orbicular.

Some time since I sent over to M. Deshayes a few specimens of three or four species, thought to bear a very close resemblance to those of the Paris basin, requesting he would be kind enough to compare them with his own types; and since the first part of my MS. had gone to press, I have received a communication from that gentleman, who has obligingly complied with my request. He says: "J'ai examiné avec la plus grande attention vos trois espèces *Lucina squamosa, Erycina miliaria,* and *Nucula miliaris,* avec les types qui me restait dans ma collection et il resulte pour moi de cet examen répété un grand nombre de fois, qu'aucune de vos espèces n'est parfaitment identique avec celles de notre bassin Parisien. Ces espèces et les notres ont entre elles de grandes resemblances mes elles offrent aussi des differences constantes."

The means of determination possessed by M. Deshayes are probably sufficient to enable him justly to separate the Crag shell from the Older Tertiary species, and I have given a new name to our fossil upon such decision; and in consequence of the above opinion so strongly expressed, I have re-examined my own Crag specimens of *Nucinella miliaris* with what I have considered as the same species from the Paris basin in my own Cabinet, but with a high respect for the opinion of that able naturalist, I cannot reconcile myself to the belief, that the differences observable between the two are sufficiently prominent to justify a specific removal for the British fossil.

DOUBTFUL.

4. LUCINA COLUMBELLA, *Lamarck.*

LUCINA COLUMBELLA. *Lam.* Hist. des An. s. Vert., t. v, p. 543, No. 15, 1818.
— — *Basterot.* Mém. Geol. des Env. de Bord., p. 86, pl. 5, fig. 11, 1825.
— — *Bronn.* Lethæa Geogn., p. 959, t. 37, fig. 15, *a—d*, 1837.
— — *Dujard.* Mém. de la Soc. Geol. de France, tom. ii, pt. 2, p. 258, 1837.
— — *Dubois de Mont.* Foss de Wolhyn., p. 57, pl. 6, figs. 8—11, 1831.
— — *G. B. Sowerby.* Genera of Shells, No. 27, fig. 6.
— — *Phil.* En. Moll. Sic., vol. ii, p. 26, 1844.
— — *Reeve.* Conch. Icon. LUCINA, pl. 6, fig. 30.
— VULNERATA. *De France*, sec. *Basterot.*

Three specimens of this species are among the Red Crag Fossils in the Woodwardian Museum at Cambridge; and as it will be seen by the above references, it was an inhabitant of the Seas which deposited the Bordeaux Beds, found also in the Faluns of Touraine, in the Plateau Wolhyni-Podolien, and according to Philippi, has been obtained at Sortino, in the Val di Noto, it is very possible it may have had an extension into the Red Crag, more especially as a shell resembling this (probably only a variety) is still a living species on the N. W. Coast of Africa.

No satisfactory information respecting these so called Red Crag specimens could, however, be given by any of the gentlemen connected with the Cambridge Museum, although Professor Sedgwick says he believes them to be true Crag shells, but being myself unable thoroughly to examine their lithological character, and never having seen the same species in any other Collection of Crag Fossils, and in the absence of all knowledge of their correct locality, they must, at least for the present, be considered as not strictly entitled to a place in the undoubted Fauna of that Period.

DIPLODONTA,* *Bronn.* 1831.

TELLINA (sp.). *Mont.*, 1803.
MYSIA (sp.). *Leach*, MS., 1819. *Brown*, 1827.
VENUS (sp.). *Broc.* *Nyst.*
LUCINA (sp.). *Def.* *Desh.*
DIPLODONTA. *Bronn.*, 1831.
SPHÆRELLA ? *Conrad*, 1838.

Generic Character. Shell somewhat thin, more or less orbicular, equivalve subequilateral, externally smooth, or slightly marked by lines of growth, umbones not very prominent. Hinge composed of two cardinal teeth in each valve, the anterior one in the right valve simple, the other bifid, and the reverse in the left, no lateral teeth. Ligament external, no lunule. Impressions by the adductors ovate; mantle mark without a sinus.

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* Etym. Διπλόος, double, ὀδούς, a tooth.

Animal of the form of the shell, with its mantle closed all round, except in front, through which a lanceolate-shaped foot is protruded: margin of the mantle with plain edges. Siphons are said to be wholly wanting.

Our recent British species has been examined by Mr. Clark, who has pointed out an apparent anomaly by which it differs from the generality of *Dimyaria,* in being wholly destitute of anything resembling siphonal tubes, and without an orifice, except the pedal one, he says, for the admission of water to sustain the functions of life.

Its position among the *Lucinidæ* is at present considered doubtful by the Malacologists, in consequence of this anomalous character in regard to the mantle; the shell, however, so strongly resembles many of the species of this group, that no other position seems so appropriate.

1. DIPLODONTA ROTUNDATA, *Montague.* Tab. XII, fig. 3 *a, b.*

TELLINA ROTUNDATA. *Mont.* Test. Brit., p. 70, t. 2, fig. 3, 1803.
— — *Mat.* and *Rack.* Linn. Trans., vol. viii, p. 56, 1807.
— — *W. Wood.* Ind. Test., p. 22, pl. 4, fig. 77, 1825.
MYSIA ROTUNDATA. *Brown.* Illust. Brit. Conch., pl. 16, fig. 11, 1827.
— — *Id.* Conch. Text. Book, p. 132, pl. 17, fig. 6, 1837.
— MONTAGUI. *Leach,* MS., fide *Brown.*
LUCINA ROTUNDATA. *Turt.* Brit. Biv., p. 114, pl. 7, fig. 3, 1822.
— — *Thorpe.* Brit. Mar. Conch., p. 73, 1844.
— — *Forbes.* Report on Ægean Invert., p. 180, 1843.
— — *Brown.* Brit. Conch., 2d ed., pl. 40, fig. 11.
— — *Reeve.* Conch. Icon. LUCINA, pl. vii, fig. 36.
PSAMMOBIA ROTUNDATA. *Flem.* Brit. An., p. 438, 1828.
DIPLODONTA ROTUNDATA. *Phil.* En. Moll. Sic., vol. ii, p. 24, 1844.
— — *Forb.* and *Hanl.* Hist. Brit. Moll., vol. ii, p. 66, pl. 35, fig. 6, and pl. M, fig. 7, 1849.

Spec. Char. Testâ suborbiculari vel trapezoidea, inæquilaterali, posticè latiore et longiore, subquadratâ, anticè rotundatâ; apicibus prominulis; margine dorsali ferè rectilineo: cardine bidentato.

Shell suborbicular, or of a roundedly trapezoidal form, inequilateral, posterior side the longer, broader, and somewhat square, anterior rounded, with slightly prominent umbones: dorsal margin nearly straight: hinge with two teeth.

Length, $1\frac{1}{8}$th of an inch.

Locality. Coralline Crag, Sutton, Ramsholt, Sudbourn, Gedgrave.
Red Crag, Sutton. Recent, Mediterranean, and British Seas.

This is a shell exceedingly abundant in the Coralline Crag, where specimens may be obtained from nearly $1\frac{1}{4}$ inch in diameter to those which are less than $\frac{1}{8}$th of an inch. In the Red Crag it is also found, but less abundantly. The hinge in both valves is furnished with two teeth, one simple, the other bifid, the simple one is placed before the umbo in the right valve, and the bifid one is anterior in the left, while the ligament occupies a position wholly external, and is deeply inserted: the muscle marks are large and well impressed, of an oblong form, with the mantle mark entire: numerous fine radiating striæ are often visible in the interior, like some of the *Lucinæ*, the outside is what may be called smooth, having only the irregular lines of increase. The shell is somewhat flattened, though occasionally tumid, more especially on the posterior side.

I have followed Philippi in assigning the Mediterranean shell to this species, as he has done in his second volume, the figure in the first volume more resembles the next species, for which it was taken when my Catalogue was compiled.

2. DIPLODONTA DILATATA, *S. Wood.* Tab. XII, fig. *a, b.*

DIPLODONTA DILATATA. *S. Wood.* Catalogue, 1840.
— — ? *Nyst.* Coq. Foss. de Belg., p. 138, pl. 7, fig. 1, 1844.
— — *J. Sow.*, in Dixon. Geol. and Foss. of the Tert. and Cret. Form. of Sussex, p. 167, t. 3, fig. 16, 1850.
VENUS FRAGILIS? *Nyst* and *West.* Nouv. Rech. Coq. Foss. d'Anv., p. 9, pl. 3, fig. 11.

Spec. Char. Testâ transversâ, ovatâ, inflatâ, inæquilaterali, tenui, posticè longiore utrinque convexâ; margine dorsali rotundato; apicibus obtusis, depressis.

Shell transversely ovate, tumid, inequilateral, thin, posterior side the larger, both sides convex; dorsal margin rounded; umbones obtuse, depressed.

Length, $\frac{3}{4}$ths. *Height,* $\frac{5}{8}$ths of an inch.

Locality. Coralline Crag, Sutton, and Gedgrave. Red Crag, Sutton.

This species is not at all abundant. There are about a dozen specimens in my Cabinet presenting characters that appear of sufficient prominence to entitle it to be considered as different from the preceding one, and a few more particulars may therefore be pointed out to support the opinion. Our shell is more regularly rounded on both sides, and has not the squareness of outline so conspicuously shown in that species, where the dorsal margin forms a straight line, giving a distinct angle on the posterior side, whereas in this one it is eminently rounded, and the whole shell is more regularly tumid; the posterior side is considerably the larger, and the umbones are rather depressed, turning a little towards the anterior, and the ligamental area is smaller than in the preceding species; the shell is thin, and the muscle marks not very well defined, but where they are seen, they appear to be different in size, the posterior one being the longer, and of a rounded oblong form, and that by the mantle without the least inflection; the teeth are two in each valve, one simple, the other bifid, the posterior one is simple in the left valve, in the right it is anterior; the bifid one is less, and the single one is better defined than in the preceding species; the whole aspect of the shell is also different, that I have no hesitation in separating the two. This species and *rotundata* are found in the same locality, and I have one specimen from the Red Crag in good preservation, exhibiting the same distinction. The figure by Nyst more strongly resembles this species than the last one, so also does that by Philippi. The latter author states his shell to be living in the Red Sea, thus giving a greater probability to its being different from the one living in the British Seas; a few specimens of apparently the same species from the Older Tertiaries at Bracklesham are in the Cabinet of Mr. Edwards, one of which has been figured in Mr. Dixon's work above referred to. In comparing them with the Crag specimens some trifling differences may be observed, but they do not appear of sufficient importance for specific distinction, and the Crag shell is in all probability the prolonged existence of the Bracklesham fossil. In dental characters they are precisely the same, but the Crag shell is rather more tumid, and it is also a little longer, the dorsal margin being somewhat less rounded than in the older shell, and the exteriors of the Crag specimens have merely fine and somewhat irregular lines of growth, while the Bracklesham fossil has rather more regular concentric striæ, they however both present sufficient distinction to justify a separation from the recent British species.

3. Diplodonta? astartea, *Nyst.* Tab. XII, fig. 2, *a*, *b*.

Tellina astartea. *Nyst.* Rech. Coq. Foss. d'Anv., p. 5, pl. 1, fig. 18, 1835.
Lucina gyrata. *S. Wood.* Catalogue, 1840.
— astartea. *Nyst.* Coq. Foss. de Belg., p. 121, pl. 6, fig. 4, 1844.
Mysia Americana? *Conrad.* Foss. Shells of the Med. Tert. United States, p. 30, pl. 16, fig. 2.
Diplodonta parvula? *Nyst.* Coq. Foss. de Belg., p. 139, pl. 7, fig. 2, 1844.

Spec. Char. Testâ obliquâ, ovato-obiculari, depressiusculâ, inæquilaterali; in senectute intus spissatâ; posticè majiore, anticè subangulatâ; dente cardinali bifido.

Shell oblique, ovately orbicular, somewhat depressed, inequilateral, inside of specimens thickened; posterior side the larger, anterior subangulated: cardinal tooth bifid: no lunule.

Diameter, $\frac{3}{4}$ths of an inch.

Locality. Cor. Crag, Sutton. Red Crag, Sutton.

This shell is very abundant in the Red Crag, but it is rather scarce at one locality, from the Older Formaiton of the Coralline Crag, and presents some slight differences, though not sufficient to remove it from the species.

Our shell measures three quarters of an inch from the anterior to the posterior side, and about the same or a trifle less from the umbo to the ventral margin, these proportions are occasionally reversed, but there is in general not much variation in this species: it is somewhat oblique, and measures rather more from the dorsal edge or position of the ligament to the opposite margin than in a contrary direction, although, in the young shell, it is the reverse; the umbones are prominent, the hinge has one simple and one bifid tooth in each valve, the surface is marked with somewhat irregular lines of growth at considerable distances. The interior in the adult shell is much thickened, as in some of the species of *Lucina*, showing the muscle marks deeply impressed; they are nearly equal in size, though the anterior one is rather narrower, the line of the mantle is without the least inflection: in the thickening of the interior a ridge is produced near the upper anterior margin, giving the appearance of an additional muscle mark; a similar appearance may be seen in the old specimens from the Coralline Crag, besides an obscure ridge running down the centre dividing it into two nearly equal parts. There is no doubt of this species being identical with the Belgian fossil, and according to M. Nyst, it is said to have been found in the Older Tertiaries from the environs of Paris. I have not seen it from the Mam. Crag.

D. apicalis, Phil., somewhat resembles the young of our shell, but it appears to have a greater comparative height from the umbo to the margin; and I have been unable to see a specimen of this or of *D. trigonula*, Bronn, which also does not very greatly differ.

The dentition of this species precisely resembles that of *D. rotundata*, as well as the muscle marks of the interior, from which it is presumed to belong to the same genus, but the interior of aged specimens is thickened like those of *Lucina*, to which it appears to be very closely related. The specimen figured has a somewhat sinuated form in the margin on the posterior side, which is merely accidental; it was selected for the purpose of showing the interior.

LUCINOPSIS, *Forbes* and *Hanley*, 1849.

MYSIA. "*Leach,*" *Lam.*, 1818. *King*, 183-? *S. Wood*, 1840.
VENUS (sp). *Penn. Mont. Flem. Phil. Lovén.*
LUCINA (sp.). *Turt. Lam.*
CYTHEREA (sp.) *Macgill*, 1843.
ARTEMIS (sp.). *Alder*, 1847. *Recluz.*
DOSINIA (sp.). *Gray*, 1847.

Generic Character. "Shell more or less orbicular, rather thin, equivalve, slightly inequilateral, closed; surface smooth or concentrically striated, inner margin entire; muscular impressions oblong or suborbicular, nearly equal. Palleal sinus wide, deep, central, obtuse. Hinge composed of two diverging central teeth, one of which is bifid in the right valve, and three, the central one bifid, in the left. Ligament external, prominent, rather long. No defined lunule."

"Animal suborbicular, its mantle freely open, the margins entire. Siphonal tubes short, diverging, separate, the branchial with its orifice fringed, the anal simple. Foot lanceolate. Labial paps, small, triangular."

This being the first and only diagnosis of the genus I have seen, it is copied from the authors of the 'Hist. of British Mollusca,' whose name is here adopted.

The long and well-known British species *Venus undata*, of Pennant, is considered as the type of the genus.

It has been justly remarked, by Messrs. Forbes and Hanley, that in consequence of its anomalous character, this shell has been bandied about and placed in many different genera, but generally with a doubt respecting its true position; the deep palleal sinus indicated the possession of somewhat elongated or at least projecting siphons, thereby differing from the animals of true *Lucina*, in which genus some authors had placed it, where from its dental characters and general appearance it seemed most entitled to be situated. They have, however, removed it from among the family *Lucinidæ*, and placed it in the *Veneridæ*, in consequence of the deeply sinuated form of the palleal impression; and this view of its connection seems to have been taken by other Malacologists.

The possession of a sinus in the impression of the mantle mark is a distinction, we have elsewhere seen, in all probability sufficient for the removal of a shell with such a character out of a genus, where others have the mantle mark perfectly entire, but there is no sufficient reason in that alone that it should be removed to any very distant position. Its general affinities appear more in connection with those of *Lucina* than with those of *Venus*, differing from the former only in the aberrant character of a prolongation in the siphonal tubes, bearing the same relationship to *Lucina*, or rather to *Diplodonta*, that *Leda* does to *Nucula*, or as *Adacna* to *Cardium:* I have, therefore, again ventured to remove it from among the *Veneridæ* to what appears a more correct position.

The name of *Mysia* was proposed in MS. for a genus by Dr. Leach, in which the *Venus undata*, Penn., was placed; and this name has been published by Lamarck in his 'Hist. Nat. des An. sans Vert.,' t. v, p. 543, 1818, thereby giving it a status in regard to time; and considering that sufficient for its right to priority, it was adopted by myself in 'The Catal. of Crag Shells,' for the Crag species, but another well-identified shell belonging to the genus *Diplodonta* had also attached to it the same generic name, and this was published by Brown, in 1827. It is not now possible to say which of the two species was intended as the type of his proposed new genus, and therefore, to unravel the difficulty, or rather to cut the Gordian knot, the authors of *Lucinopsis* have, perhaps wisely, rejected in toto the name of *Mysia*.

This appears a very natural genus, although very few species are yet known either in a recent or fossil state. Two or three shells from the Greensand Formation, figured and described under the name of Thetis, somewhat resemble it in the dental characters, but they have a deeper and more angulated sinus in the mantle mark.

1. Lucinopsis Lajonkairii, *Payraudeau*. Tab. XI, fig. 14, *a*—*c*.

Ency. Method., p. 272, fig. 2, *a*—*b*, 1800.
Venerupis Lajonkairii. *Payr.* Cat. Moll. de l'Ile de Corse, p. 36, pl. 1, figs. 12, 13, 1826.
— — *Desh.* 2d ed. Lam., t. vi, p. 164, 1835.
Venus lupinoides. *Nyst.* Rech. Coq. Foss. Prov. d'Anv., pl. 11, No. 41, pl. 3, fig. 14.
Mysia ornata. *S. Wood.* Catalogue, 1840.
Tellina lupinoides. *Nyst.* Coq. Foss. de Bëlg., p. 111, pl. 5, fig. 4, *a*—*c*, 1844.
— ? articulata. *Id.* - - - p. 110, pl. 6, fig. 1, *a*, *b*.

Spec. Char. Testâ tenui, orbiculari vel subpentangulari, vix æquilaterali, tumidâ, subobliquâ; striis confertis, articulatis; umbonibus prominulis, approximatis; margine integro.

Shell thin, orbicular, or somewhat of a pentangular outline, scarcely equilateral, tumid, and rather oblique; ornamented with numerous close-set articulated striæ; beaks slightly prominent and close; margin smooth.

Diameter, 1⅛th of an inch.

Locality. Cor. Crag, Ramsholt, and Sutton.
Red Crag, Sutton. Recent, Corsica and Sicily.

About a dozen specimens of this species in perfect condition have been obtained by myself from the Coralline Crag at Ramsholt: a few with the valves united, and one only from the Red Crag.

Not having been able to obtain a specimen of the recent shell for comparison, its identification is dependent upon the figures and descriptions above referred to, but its outward form and ornamented exterior are so peculiar, that it is assigned to the Mediterranean species without much hesitation.

The hinge of the right valve is furnished with two primary diverging teeth, the posterior one being bifid, while the left valve has three teeth; the centre one of which is large and double, or so deeply cleft, as to give that valve the appearance of having four; there are no distinct lateral teeth, though on the anterior side the lateral edges interlock; it has but an elongated fulcrum for the external ligament; there are no lunule: the two large impressions by the adductors, the anterior one being the smaller and more narrow; the impression by the mantle is large, deep, and rounded, ascending beyond the middle of the shell, and extending over to the anterior side. In outline it much resembles *L. undata*, and also in its very visible but somewhat irregular lines of increase, but it differs in the possession of numerous radiating striæ. The length generally exceeds the height by about an eighth, but in some specimens there is no difference.

HIPPAGUS.* *Isaac Lea*, 1833.

VERTICORDIA. *S. Wood*, MSS., 1842.

Generic Character. "Shell cordate, inflated, without teeth; beaks large, recurved, margin slightly overwrapping beneath the beak: anterior cicatrix long, posterior cicatrix round."

The above is given by Lea in his 'Contributions to Geology,' as the diagnosis of a genus proposed to be established upon a small fossil shell found in the United States, in a Formation of the Older Tertiary Period, and it has been adopted by Philippi, who has included in it a fossil from the Valley of the River Lamati, in Calabria, and as this appears to be identical with our Crag Species, I have followed the latter Author in the generic assignment.

* Etym. *Hippagus*, a horse-ferry boat.

1. **Hippagus verticordius**, *S. Wood,* Tab. XII, fig. 18, *a, b.*

Cryptodon? verticordia. *S. Wood.* Catalogue, 1840.
Verticordia cardiiformis. *S. Wood.* MS., 1844.
— — *J. Sowerby.* Min. Conch., t. 639, 1844.
Hippagus acuticostatus. *Phil.* En. Moll. Sic., vol. ii, p. 42, t. 14, fig. 19, 1844.

Spec. Char. Testâ suborbiculari vel cordiformi, convexâ, subæquilaterali, tenui, costatâ costis circa 16 *incurvatis, compressis, radiantibus, rugosis; apicibus antrorsùm involutis; margine denticulato.*

Shell suborbicular, or heart-shaped convex, thin, subequilateral, costated, ribs about 16, incurved, radiating, compressed, rugose; apices involute; margin denticulated.

Diameter, $\frac{3}{8}$ths of an inch.

Locality. Coralline Crag, Sutton.

This elegant shell is by no means abundant as a British fossil, and from the figure and description above referred to, there is every reason to believe the same species once inhabited the seas which deposited the Upper Tertiaries of Calabria. A slight difference exists between our shells, as far as can be determined without an inspection of the specimens, but such as does not appear to be more than a local variation, and not sufficient to affect their specific identity.

The Italian fossil has given to it only 13 ribs, while there are 15 to 16 in our shell, but like some species in the genus *Cardium* (which it resembles externally,) this may be a variable character: the ribs are elevated, and laterally compressed, rounded on the top, but not sharp or angular, as Philippi's name would seem to imply, and as his figure represents; they are elegantly curved, and are generally rugose, or coarsely imbricated, and distributed at about equal distances; the concave spaces between them are rather wider than the ribs themselves, and appear to be finely granulated, or studded over with small papillæ. In the interior are the marks of two somewhat large adductor muscles, the anterior one is the more deeply impressed, that by the mantle is indistinct: the ligament or cartilage appears to have been placed so far within the dorsal margin of the shell, that when the valves were closed it was probably not visible, being placed in a depression beneath the margin, extending into a cylindrically formed aperture towards the umbo, and the receding of the ligament, or its desertion on the anterior side, causes a slight involution of the umbones, like that of *Isocardia,* though in a very minor degree. A callous, but prominent and obtuse tooth in the right valve, close to the umbo, fits into a sinus in the left valve: the shell is beautifully nacreous within, and though not particularly thin, the ribs are visibly marked in the interior by deep indentations, and they project considerably beyond the margin, interlocking and serving the office of prominent denticles.

TAB. I.

Fig.

1. Ostrea Princeps, *page* 17.
    - *a.* inside view of lower valve.
    - *b.* outside ditto of upper valve.

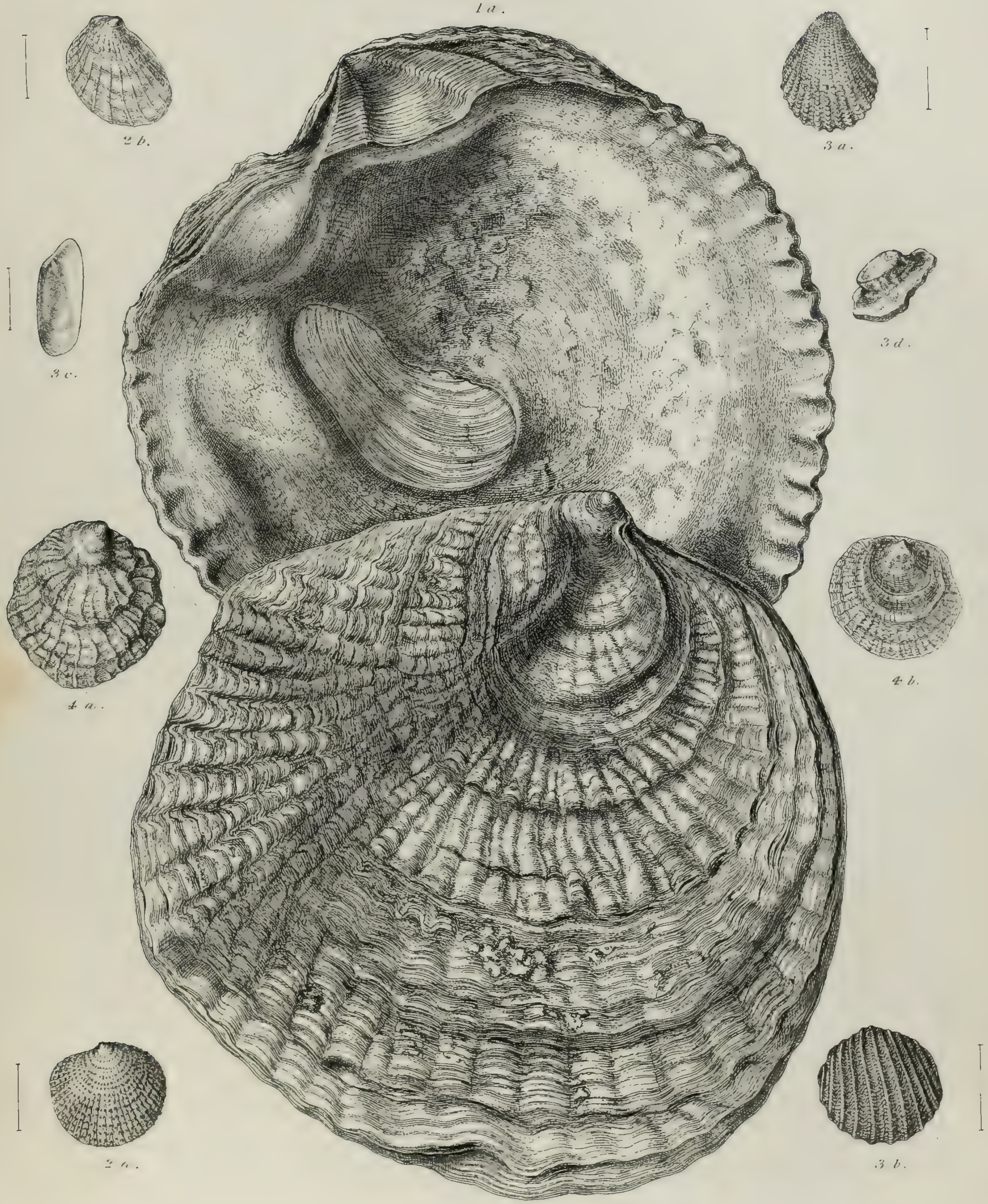
2. Anomia aculeata, *p.* 9.
    - *a.* outside view of upper valve.
    - *b.* ditto ditto var. striolata.

3. Anomia ephippium, *p.* 8.
    - *a.* upper valve of a specimen of var. squamula, showing the radiating costæ produced by the animal adhering to the umbonal region of a Pecten.
    - *b.* id., specimen formed on the central portion of a Pecten.
    - *c.* id., outside view of var. cylindrica.
    - *d.* the testaceous plug, or lapideous portion of the adductor muscle, commonly called the operculum.

4. Anomia patelliformis, *p.* 10.
    - *a.* outside of upper valve.
    - *b.* ditto ditto var. undulata.

The lines indicate the size of the specimens.

TAB. I.



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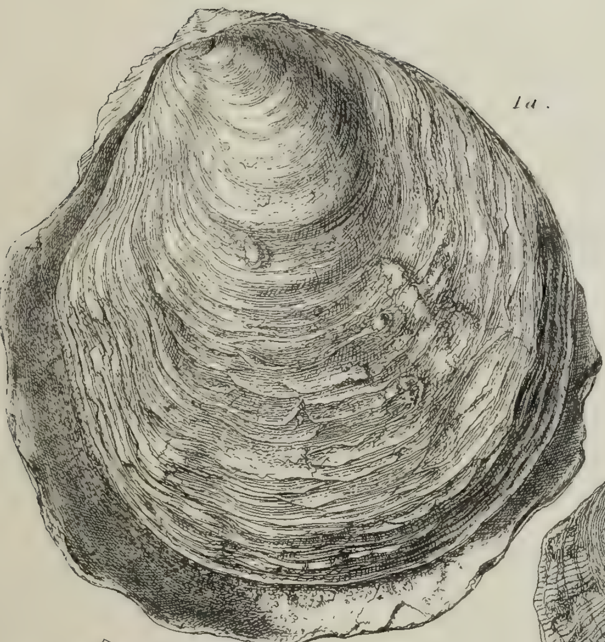
TAB. II.

Fig.

1. Ostrea edulis, *page* 13.
    - *a.* specimen with united valves.
    - *b.* outside of lower valve of var. sinuata.
    - *c.* specimen with united valves, var. spectrum.

2. Ostrea Princeps, *p.* 17.
    - *a.* outside of lower valve.
    - *b.* ditto of young specimen.

3. Anomia striata, *p.* 11.
    outside of upper or imperforate valve.



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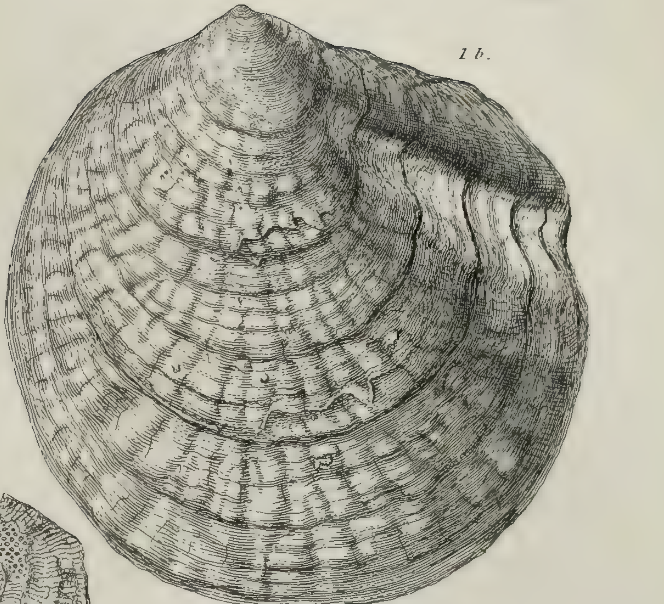

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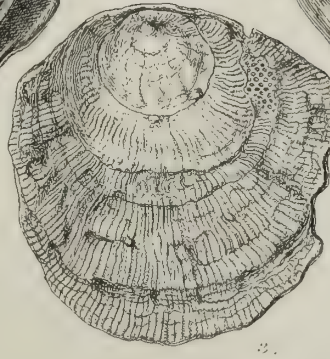

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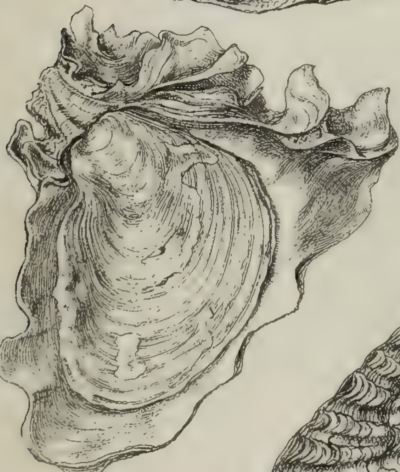

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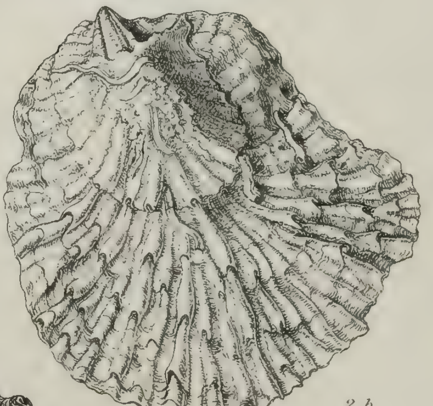

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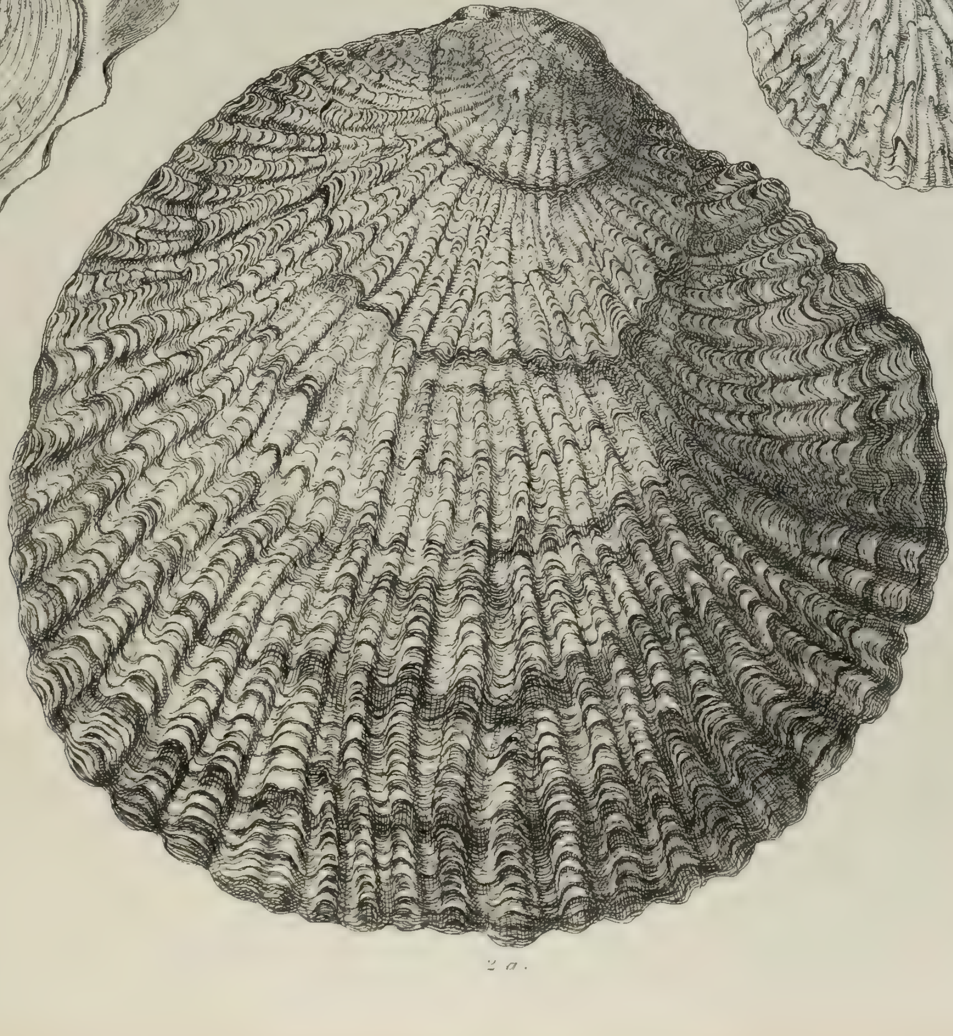

2a.

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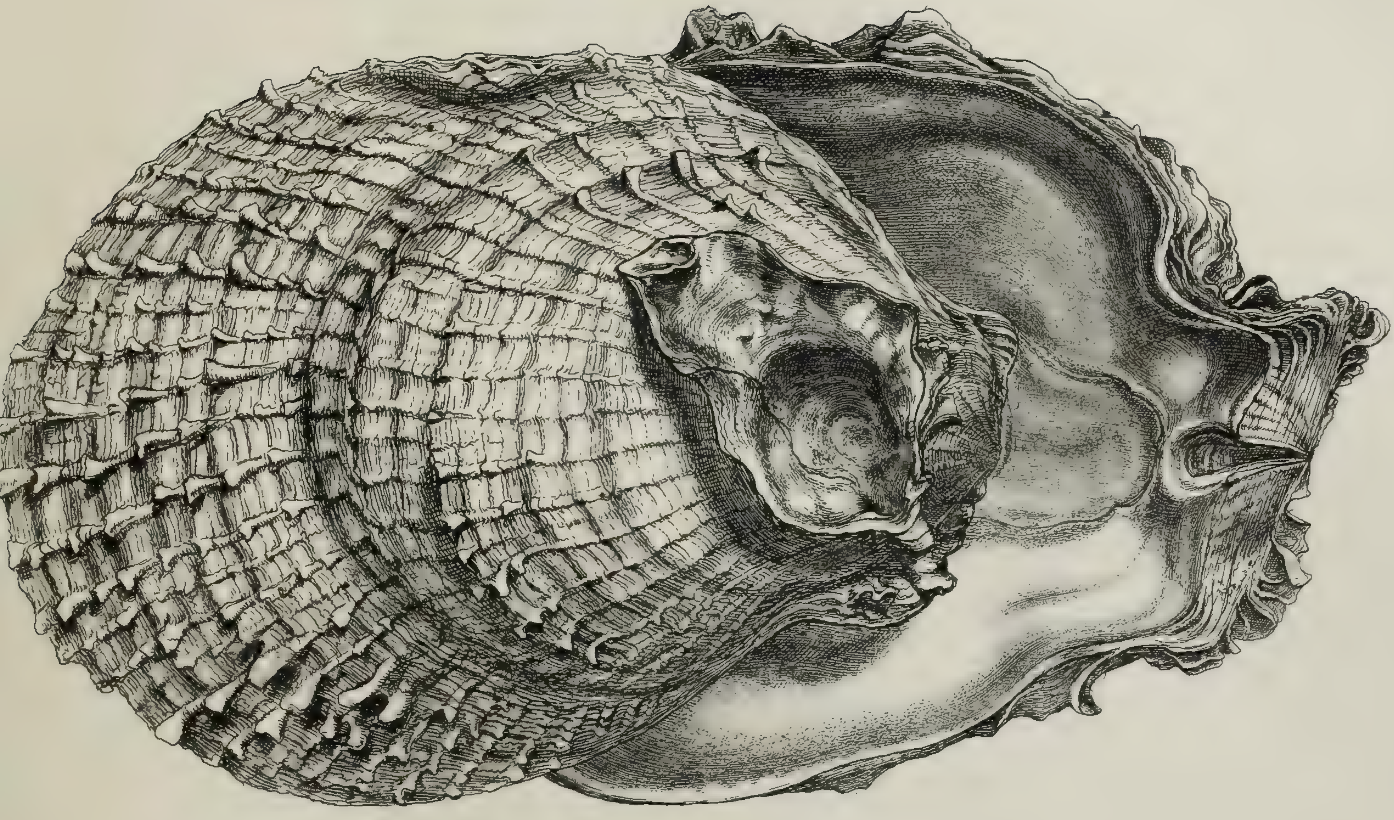
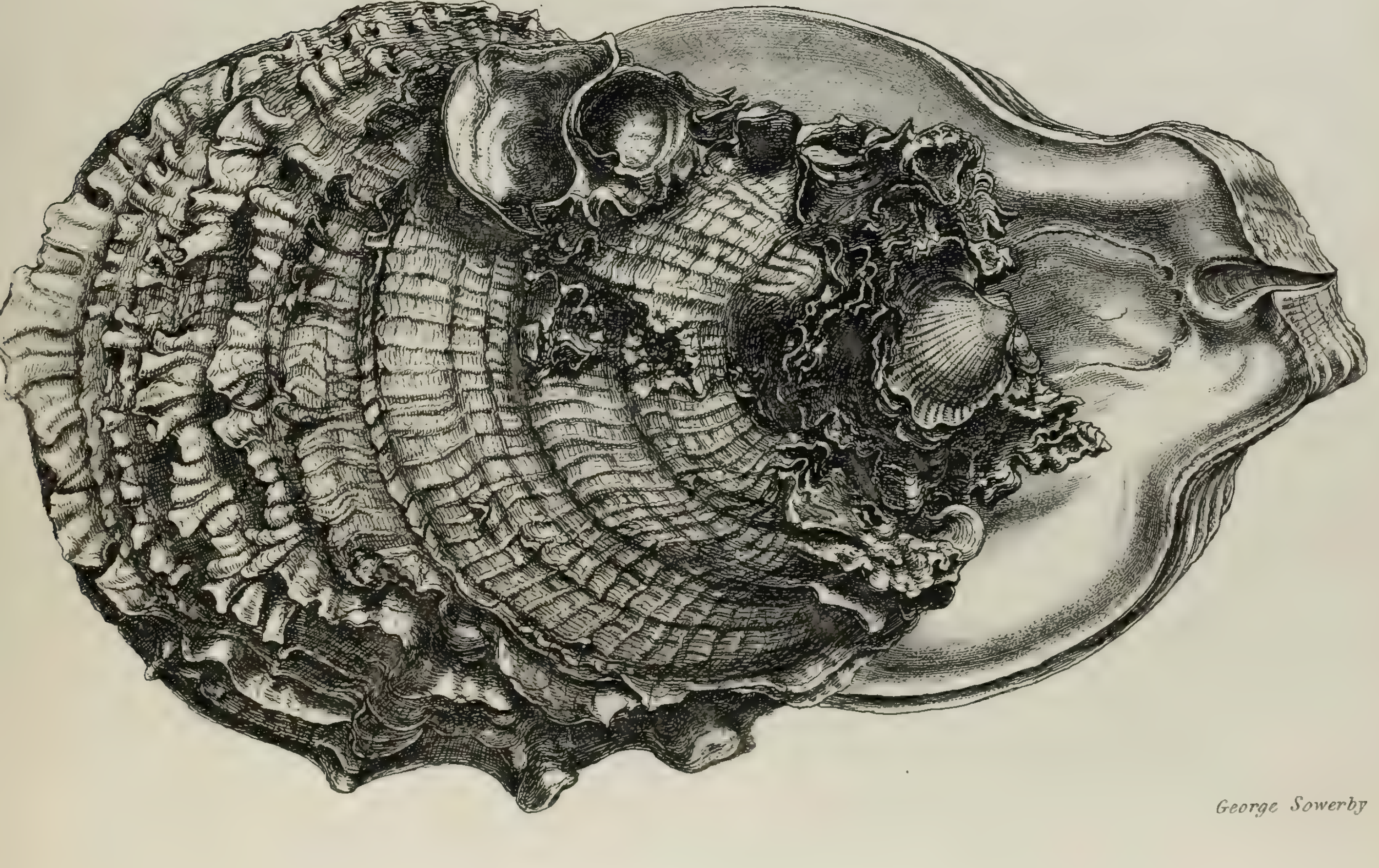
TAB. III.

Hinnites Cortesyi, *page* 19.





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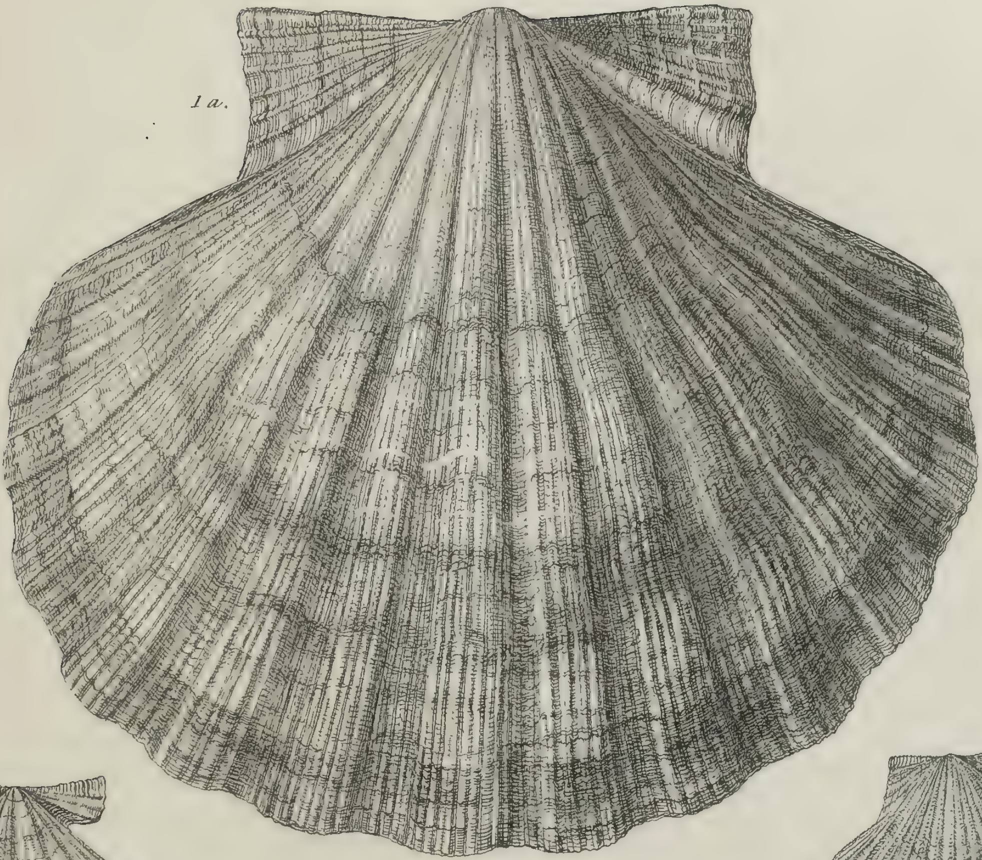
TAB. IV.

Fig.

1. Pecten maximus, *page* 22.
    - *a.* outside of lower valve of var. vulgaris.
    - *b.* id., upper valve, var. complanatus.

2. Pecten Danicus, *p.* 30.

3. Pecten dubius, *p.* 38.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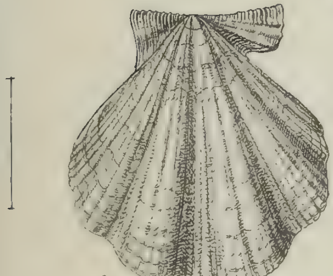
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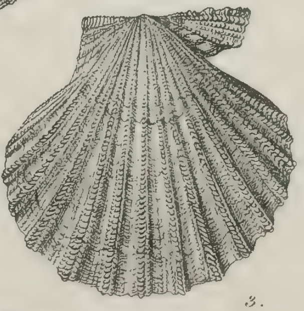
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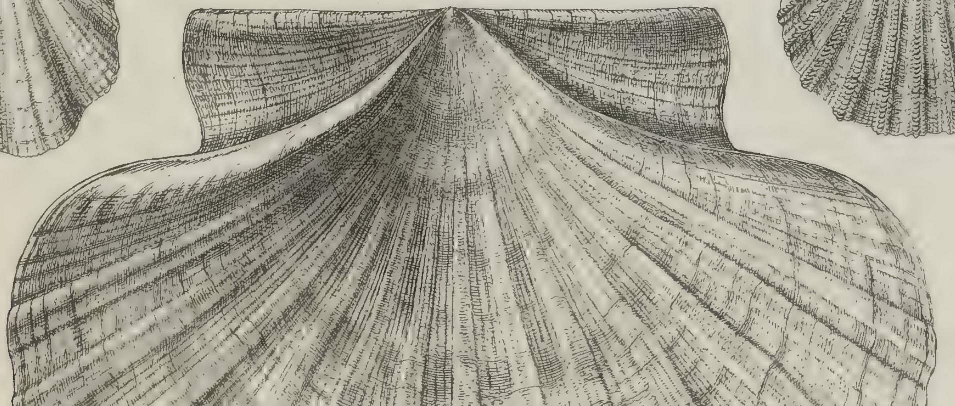
1 b.

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TAB. V.

Fig.

1. Pecten Islandicus, *page* 40.

2. Pecten tigrinus, *p*. 27.
   - *a*. var. lævis, left valve, outside view.
   - *b*. „ δ. right valve, ditto.
   - *c*. „ β. right valve, ditto.
   - *d*. „ γ. right valve, ditto.
   - *f*. „ γ. left valve, ditto.
   - *e*. „ γ. id., showing a different mode of growth.
   - *g*. „ exoletus, right valve.

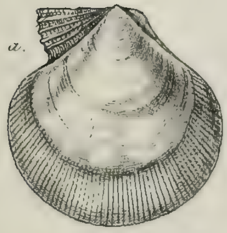
3. Pecten Bruei, *p*. 29.
   - *a*. right valve.
   - *b*. left valve.

4. Pecten similis, *p*. 25.
   - *a*. left valve, with a single divergence of coloured lines.
   - *b*. id., with zigzag lines.
   - *c*. right valve.

5. Pecten Gerardii, *p*. 24.
   - *a*. right valve.
   - *b*. left valve.

The lines indicate the size of the specimens.

TAB V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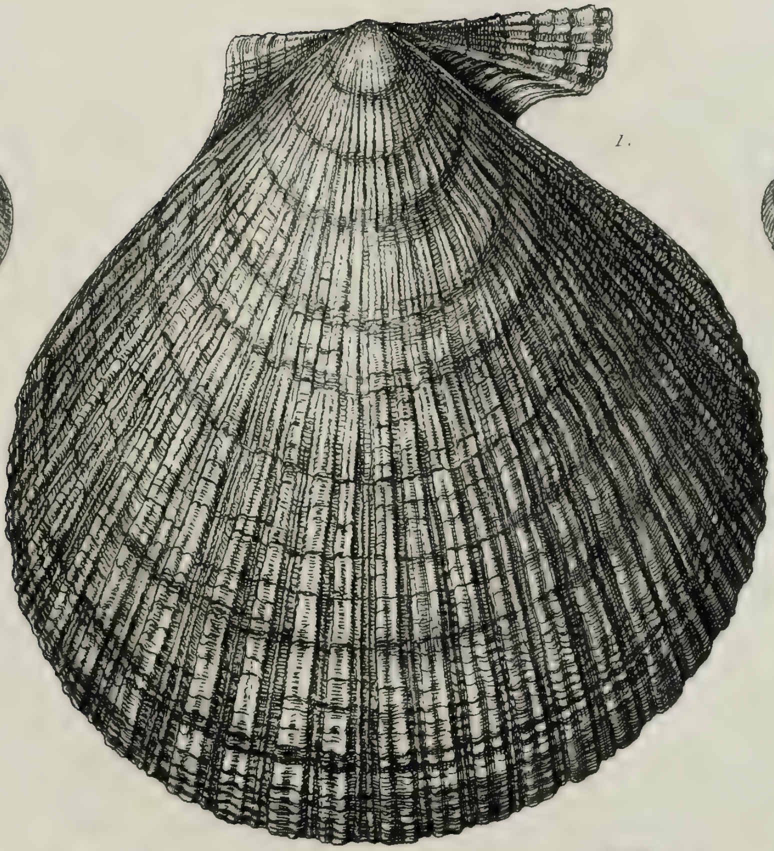
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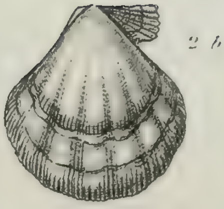
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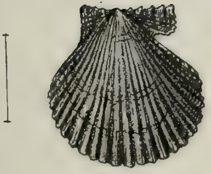
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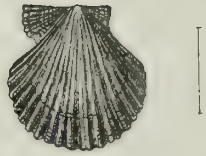
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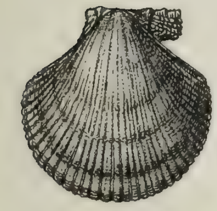
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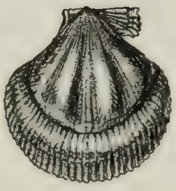
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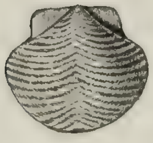
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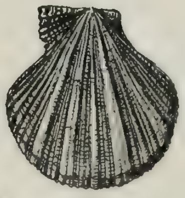
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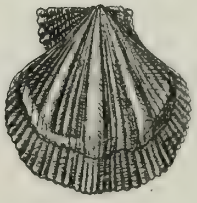
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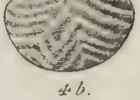
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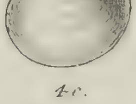
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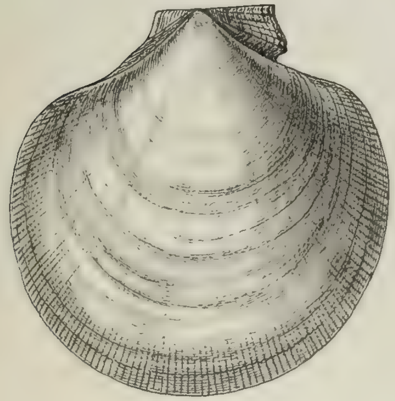
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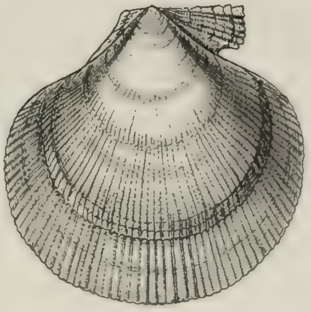
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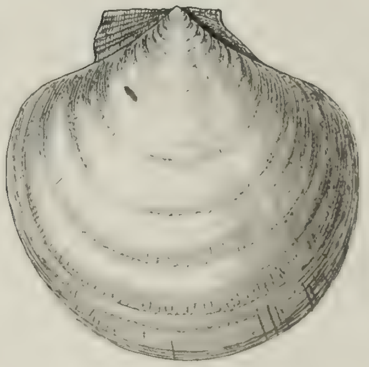
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TAB. VI.

Fig.

1. Pecten Princeps, *page* 31.

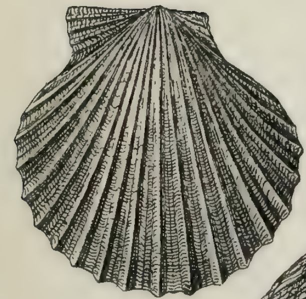
2. Pecten opercularis, *p.* 35.
   - *a.* left valve of var. lineatus.
   - *b.* id. var. reconditus.
   - *c.* id. var. scabrotus.
   - *d.* specimen with united valves, var Audouinii.

3. Pecten dubius, *p.* 38.
   left valve of var. partim imbricatus.

4. Pecten pusio, *p.* 33.
   - *a.* specimen with united valves of var. striatus.
   - *b.* left valve, var. limatus.
   - *c.* right valve, var. striaturus.

5. Pecten gracilis, *p.* 37.

The lines indicate the size of the specimens.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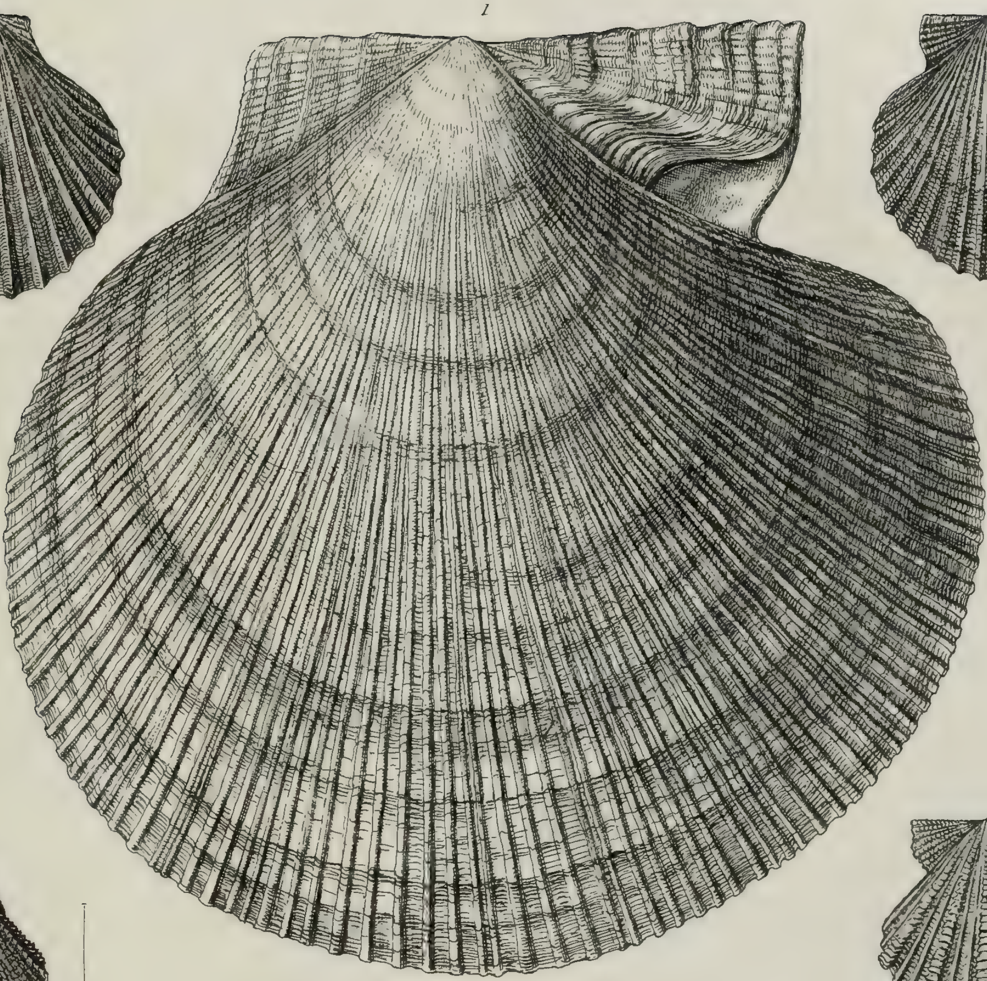

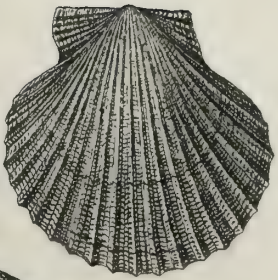
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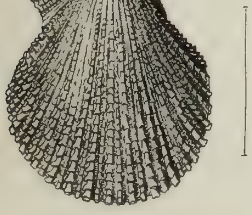
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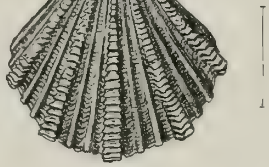
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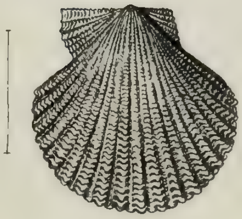
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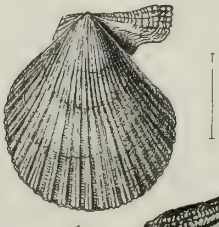
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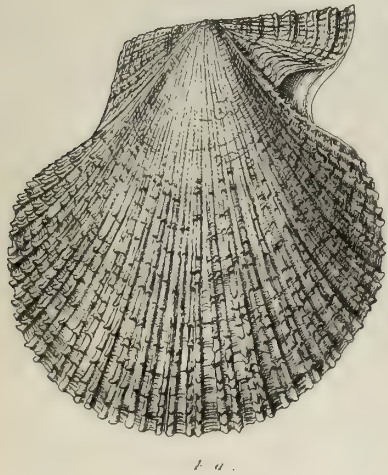
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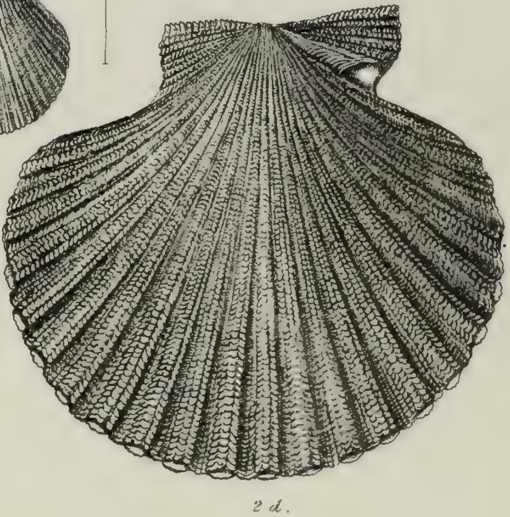
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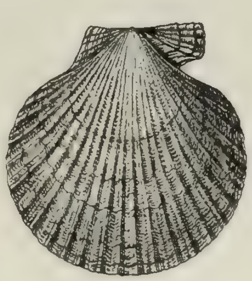
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TAB. VII.

Fig.

1. Lima Loscombii, *page* 45.

2. Lima hians, *p.* 44.

3. Lima subauriculata, *p.* 47.
    - *a.* three views of specimen, natural size.
    - *b.* enlarged view of hinge line of young individual with minute crenulations.
    - *c.* var. elongata.

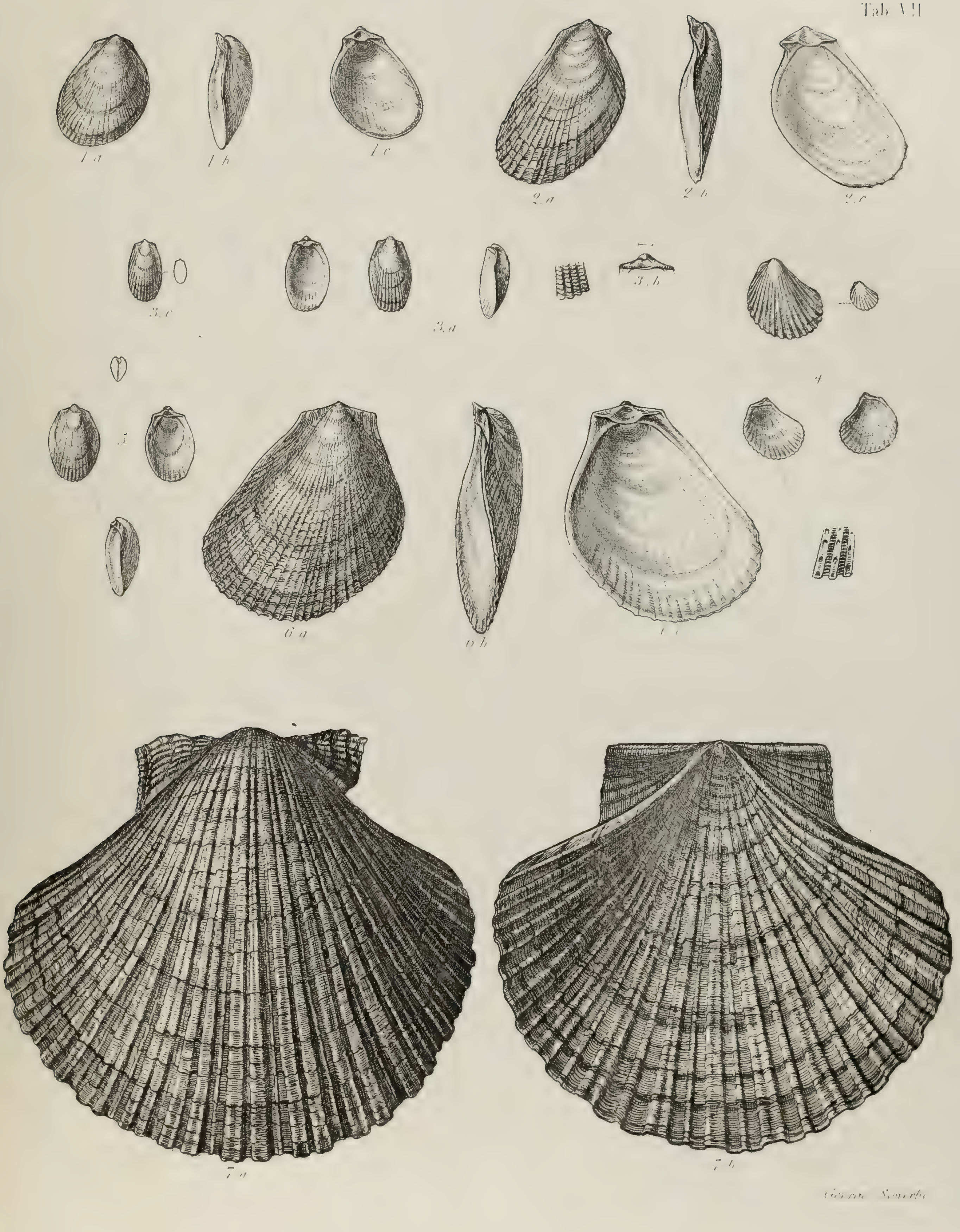
4. Lima plicatula, *p.* 46.
    Small figure the natural size.

5. Lima ovata, *p.* 48.
    Small figure the natural size.

6. Lima exilis, *p.* 43.

7. Pecten maximus, var. grandis, *p.* 22.
    - *a.* lower valve.
    - *b.* upper valve.

Tab VII



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TAB. VIII.

Fig.

1. Modiola modiolus, *page* 57.
    - *a.* outside view of var. vulgaris.
    - *b.* inside ditto.
    - *c.* inside ditto, elongated var.

2. Modiola barbata, *p.* 58.

3. Modiola sericea, *p.* 61.

4. Modiola phaseolina, *p.* 59.
    - *c.* inside view of young specimen, showing a crenulated margin.

5. Modiola discors, *p.* 60.

6. Modiola costulata, *p.* 60.
    - *a.* outside view of elongated var.
    - *b.* inside ditto var. Petagnæ.

7. Modiola marmorata, *p.* 62.

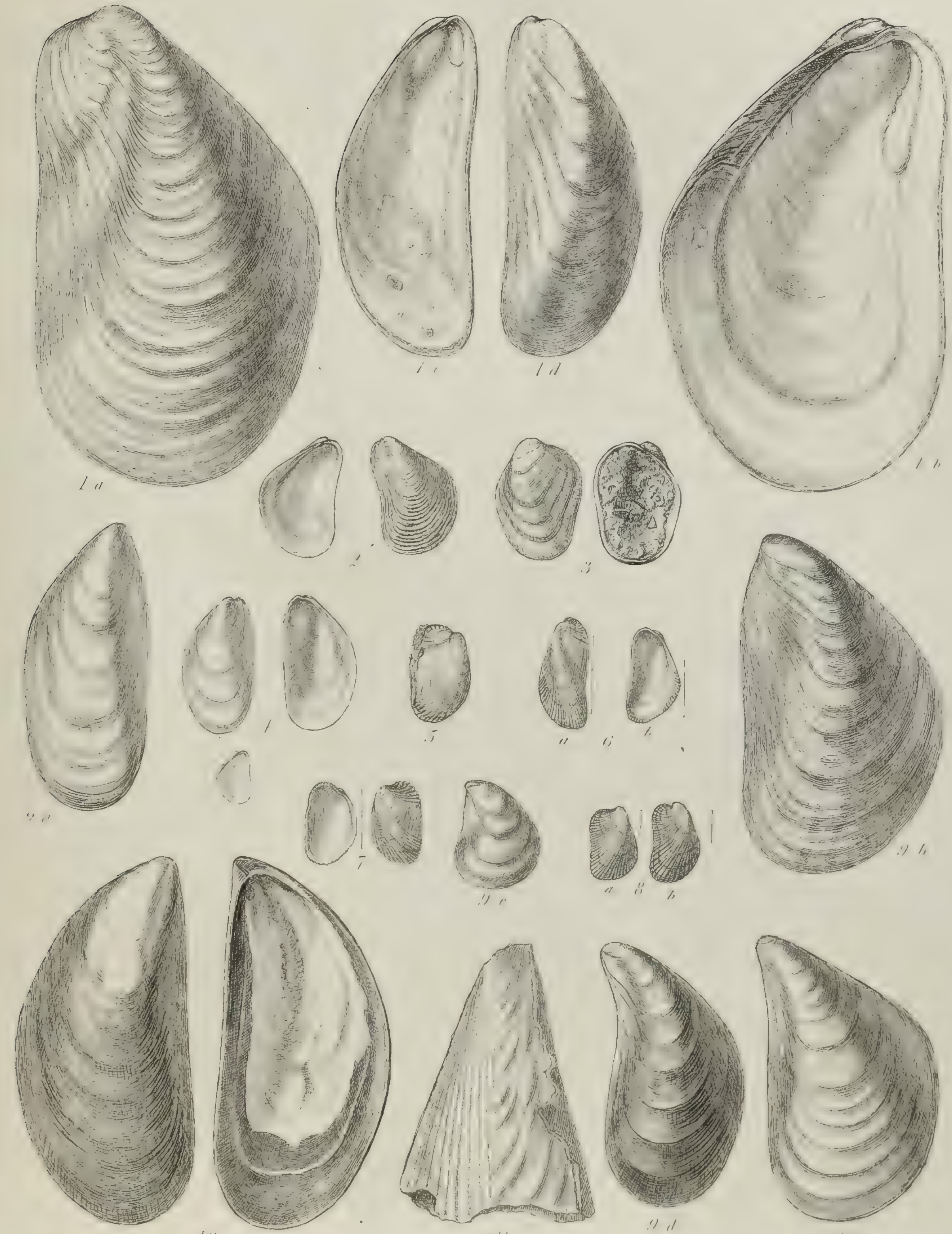
8. Modiola rhombea, *p.* 64.
    Outside view of two varieties.

9. Mytilus edulis, *p.* 52.
    - *a.* var. elegans.
    - *b.* ,, antiquorum.
    - *c.* ,, incurvatus.
    - *d.* ,, saxatilis.
    - *e.* ,, alæformis.

10. Mytilus hesperianus, *p.* 55.

11. Pinna pectinata, *p.* 50.

The lines indicate the size of the specimens.



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TAB. IX.

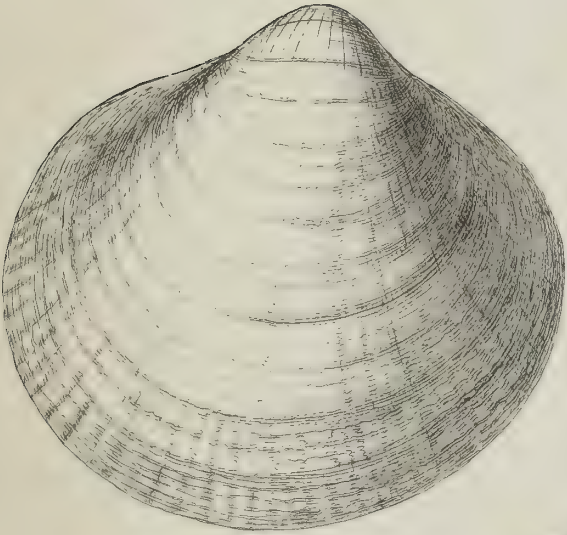
Fig.

1. Pectunculus glycimeris, *page* 66.
    - *a.* outside view of transverse var.
    - *b.* inside ditto of ditto
    - *c.* hinge line of antiquated specimen, showing the obliteration of denticles by the advance of the ligament.
    - *d.* outside of elongated var.
    - *e.* magnified view of the young shell showing one tooth only, on each side of the dental area.
    - *f.* outside view of a young specimen, with distinct and elevated costæ.
    - *g.* hinge with full complement of teeth.
    - *h.* inside view of var. subobliquus.
    - *i.* outside ditto of ditto.

2. Limopsis aurita, *p.* 70.
    - *c.* var. β.

3. Limopsis pygmæa, *p.* 71.
    - *c.* hinge magnified.

Tab. IX.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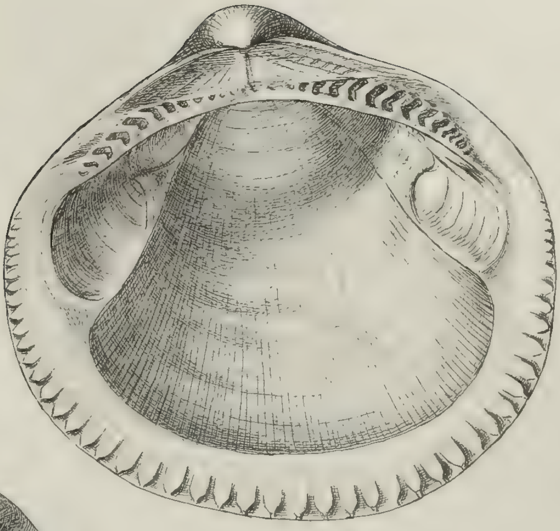
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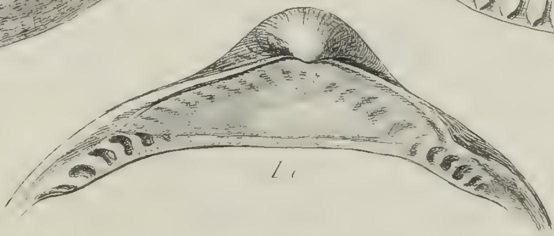
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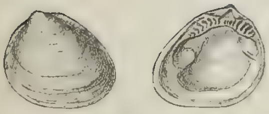
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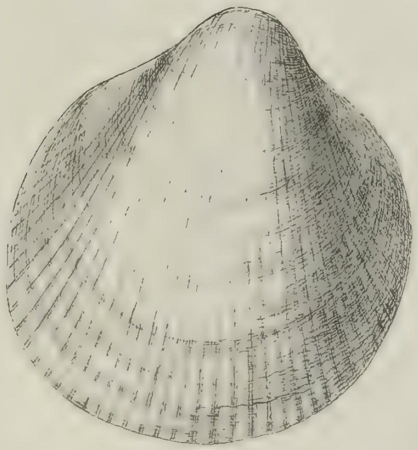
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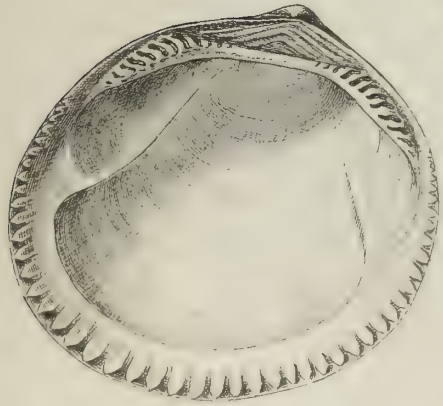
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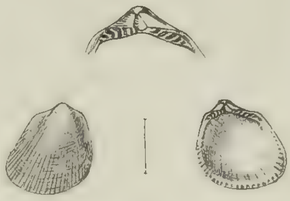
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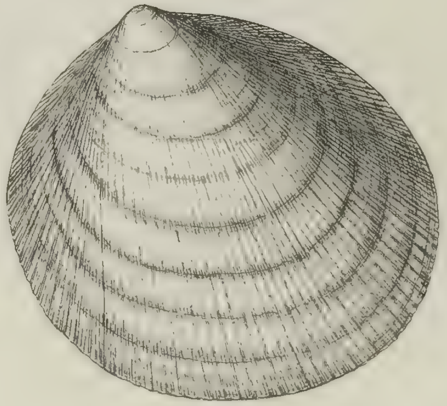
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TAB. X.

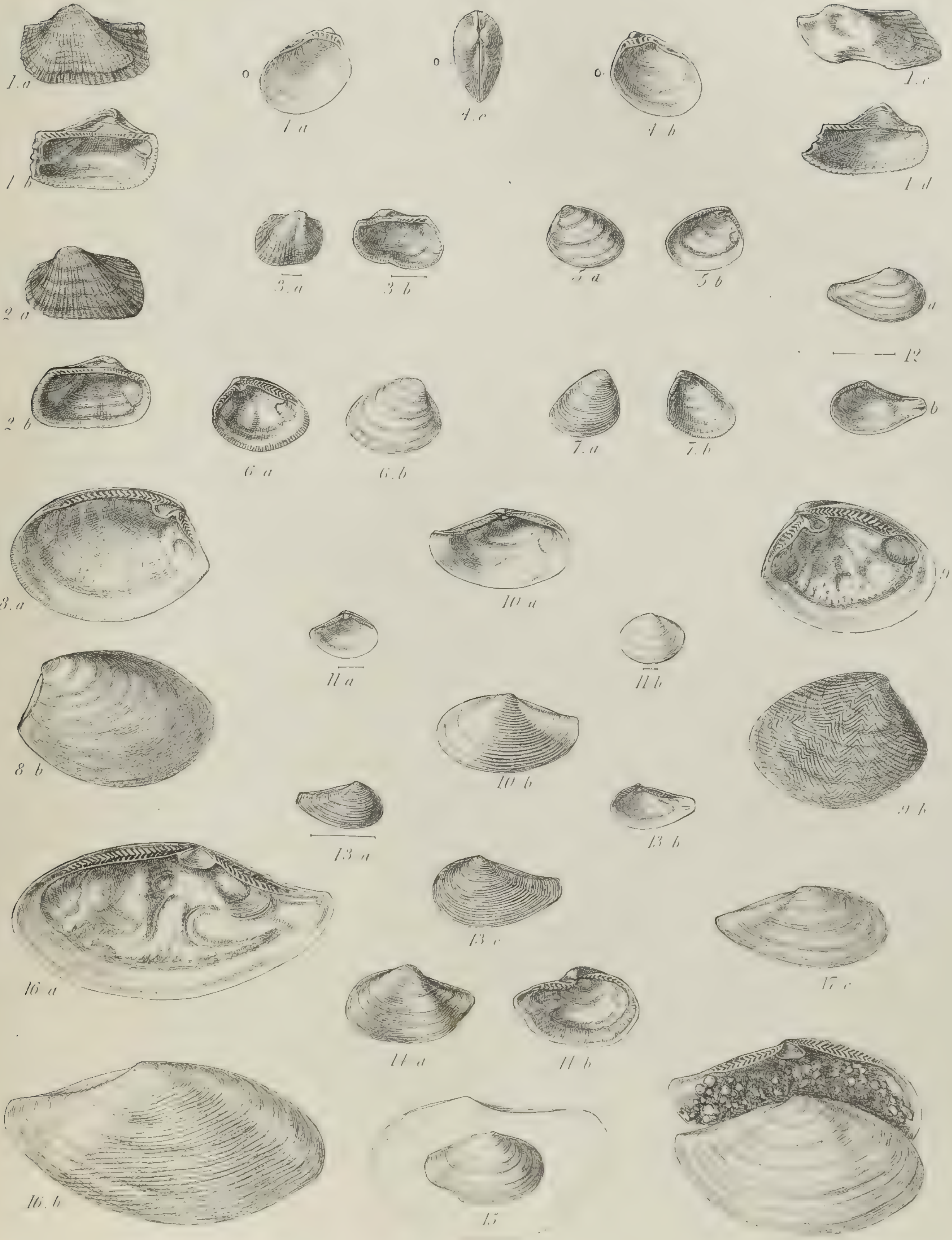
Fig.

1. Arca tetragona, *page* 76.
    - *a.* outside view of specimen from Red Crag.
    - *b.* inside view of the same.
    - *c.* outside of abraded specimen, with a sinuated form of ventral margin (Bissoarca).
    - *d.* inside of var. Britannica.
2. Arca lactea, *p.* 78.
    - *a.* outside, left valve.
    - *b.* inside of the same.
3. Arca pectunculoides, *p.* 79.
    - *a.* outside of var. brevis.
    - *b.* inside of var. elongata.
4. Nucinella miliaris, *p.* 73.
    - *a.* inside of right valve.
    - *b.* inside of left valve.
    - *c.* united valves, showing the position of the ligament.
5. Nucula tenuis, *p.* 84.
6. Nucula nucleus, *p.* 85.

Fig.

7. Nucula trigonula, *p.* 86.
8. Nucula lævigata, *p.* 81.
9. Nucula Cobboldiæ, *p.* 82.
10. Leda semistriata, *p.* 91.
11. Leda pygmæa, *p.* 95.
    - *a.* inside view of an acuminated specimen.
    - *b.* outside of a specimen of a more rounded form.
12. Leda caudata, *p.* 92.
13. Leda pernula, *p.* 93.
14. Leda truncata, *p.* 94.
15. Leda Thraciæformis, *p.* 96.
16. Leda lanceolata, *p.* 88.
17. Leda myalis, *p.* 90.
    - *c.* outside view of elongated var.

The lines indicate the size of the specimens.



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TAB. XI.

Fig.

1. Pisidium amnicum, *page* 109.
    a. inside of elongated specimen from Stutton.
    b. ditto of var. sulcatum from Grays.

2. Cyclas cornea, *p.* 107.
    a. outside of var. tumida.
    b. ditto of var. compressa.

3. Montacuta donacina, *p.* 131.
    b. inside of left valve.
    c. outside of the same.
    a. inside of var. cylindrica.

4. Kellia cycladia, *p.* 122.

5. Cyamium ? eximium, *p.* 132.

6. Lepton depressum, *p.* 116.

Fig.

7. Lepton nitidum, *p.* 116.

8. Lepton squamosum, *p.* 114.

9. Lepton deltoideum, *p.* 115.
    c. hinge of left valve slightly enlarged.
    d. ditto right valve ditto.

10. Kellia rubra, *p.* 125.

11. Anodonta cygnea, *p.* 102.

12. Unio littoralis, *p.* 98.

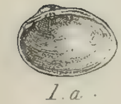
13. Unio tumidus, *p.* 99.

14. Lucinopsis Lajonkairii, *p.* 149.

15. Cyrena consobrina, *p.* 104.
    c. specimen of a more trigonal form.

The lines indicate the size of the specimens.

Tab. XI.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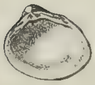
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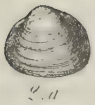
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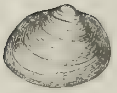
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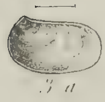
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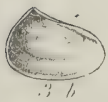
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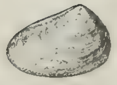
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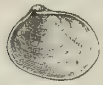
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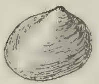
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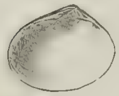
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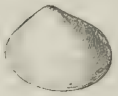
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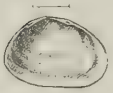
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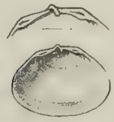
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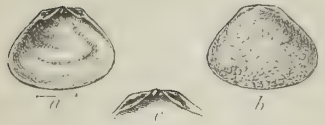
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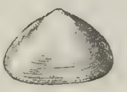
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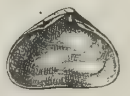
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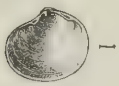
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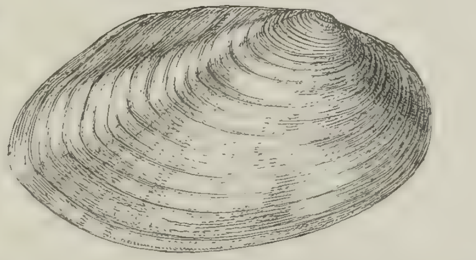
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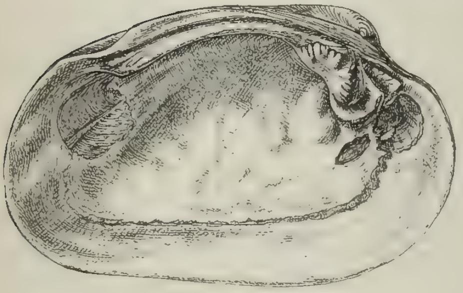
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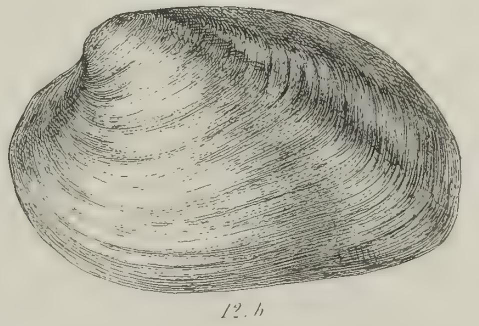
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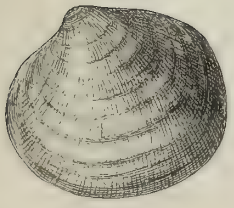
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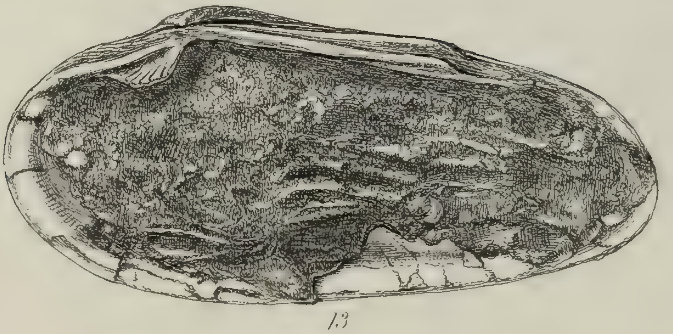
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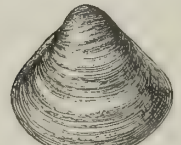
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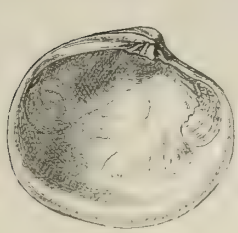
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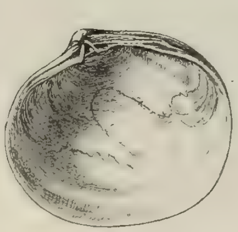
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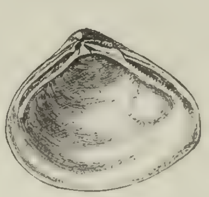
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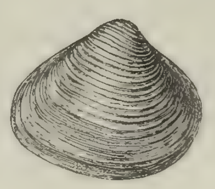
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TAB. XII.

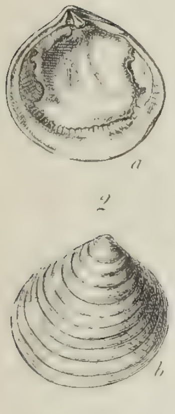
Fig.

1. Lucina borealis, *page* 139.
2. Diplodonta astartea, *p.* 146.
3. Diplodonta rotundata, *p.* 144.
4. Loripes divaricata, *p.* 137.
5. Diplodonta dilatata, *p.* 145.
6. Lucina decorata, *p.* 141.
7. Lucina crenulata, *p.* 140.
8. Kellia suborbicularis, *p.* 118.
    - *a.* orbicular variety, left valve.
    - *b.* transverse ditto, right valve.
9. Kellia orbicularis, *p.* 120.
    - *a*, *b*. interiors of both valves magnified.
    - *c*. outside view, natural size.
10. Kellia coarctata, *p.* 123.

Fig.

11. Kellia ambigua, *p.* 120.
    - *a.* trigonal variety.
    - *b.* elliptical ditto.
12. Montacuta substriata, *p.* 128.
13. Kellia elliptica, *p.* 121.
    - *b.* united valves, showing the sinuated form of hinge margin.
14. Montacuta ferruginosa, *p.* 129.
15. Kellia pumila, *p.* 124.
16. Montacuta truncata, *p.* 127.
17. Montacuta bidentata, *p.* 126.
18. Hippagus verticordius, *p.* 150.
19. Cryptodon ferruginosum, *p.* 135.
20. Cryptodon sinuosum, *p.* 134.

The lines indicate the size of the specimens.



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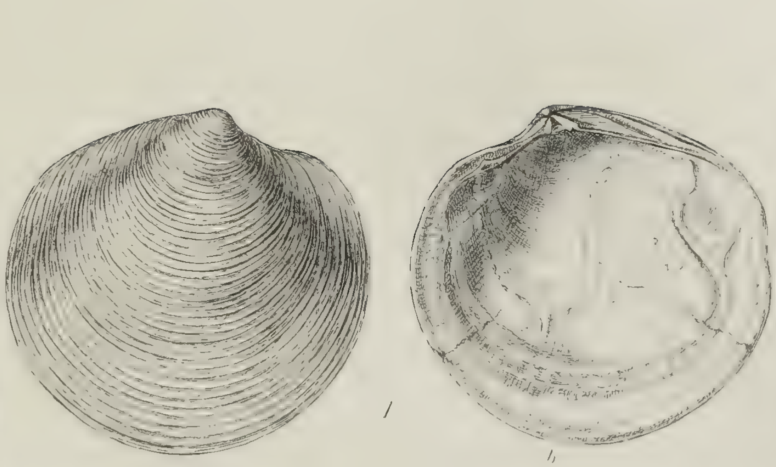

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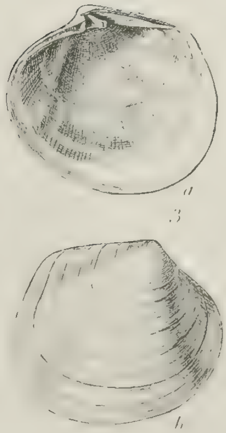

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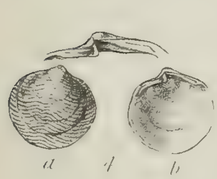

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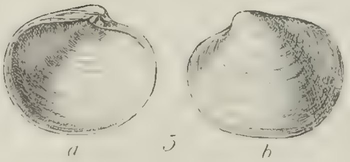

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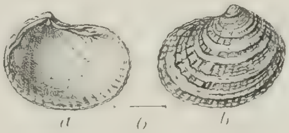

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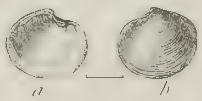

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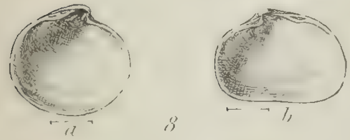

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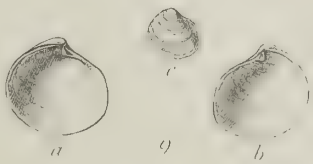

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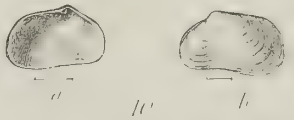

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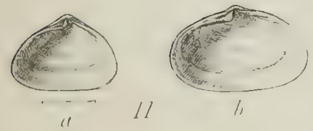

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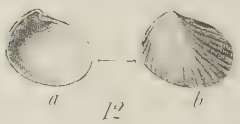

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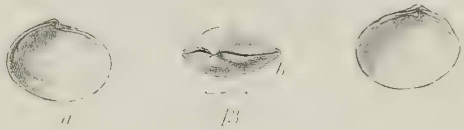

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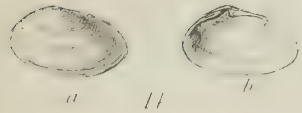

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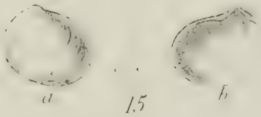

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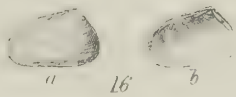

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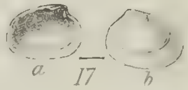

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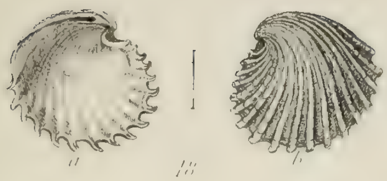

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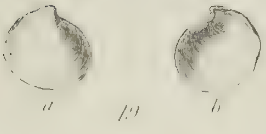

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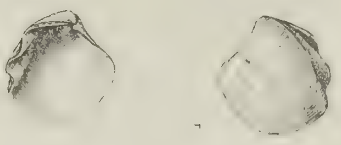

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CHIEFLY FROM

MINCHINHAMPTON

AND

THE COAST OF YORKSHIRE.

BY

J. MORRIS, F.G.S. AND JOHN LYCETT.

PART I.

UNIVALVES.

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INTRODUCTION.

The authors of the present Monograph, after due consideration of the materials at their disposal, have thought fit to limit their illustrations to the Testacea of the Great or Bath Oolite; a term under which they would include the series of beds situated between the Fullers-earth strata upon which they repose, and the Bradford clay to which they are subjacent. To have enlarged the plan, so as to include the Testacea of the Cornbrash and Forest marble, would doubtless have been more comprehensive; but in the present state of our knowledge, the advantage would have been rather apparent than real. It will be found that the very few univalves which have been assigned to those deposits are almost without exception contained likewise in the Great Oolite, and will be found in the Monograph. It is, moreover, not impossible, that at some future time a series of univalves may be obtained from the Cornbrash, or Forest marble, differing specifically from those of the Great Oolite, in which case a separate Monograph, or an appendix to the present one, might be given.

It is much to be regretted, that collections of shells should have been procured from so few situations in the long course of the formation in this country; and when it is remembered, that the Great Oolite constitutes a member of that series of secondary rocks which first engaged the attention of geologists, some surprise will mingle with our regret. The defect, however, would appear to be of easy explanation. The shells do not lie upon the surface, or become separated from the matrix by the action of the weather; they are to be procured only by carefully working away the investing stone when practicable, which is not always the case: there are likewise large areas constituting, probably, the greater portion of the formation, which are altogether destitute of organic remains, or contain only a finely comminuted shelly drift; the areas containing assemblages of well-preserved shells, would appear to be of small extent, and the presence of several of these in the vicinity of the residence of one of the authors, together with the great profusion of undescribed testacea which they have produced, have constituted the principal inducement to the present attempt of describing them; these favorable circumstances have enabled them to ascertain the position and vertical range of the species with a greater degree of accuracy than would otherwise have been possible.

Beyond the limits of the Minchinhampton district, the number of species procured has been but inconsiderable; these latter belong chiefly to Ancliff,[1] and to the vicinity of Scarborough. The parallelism of the deposits at the two former places would appear to be well ascertained, but with respect to the rocks which are so extensively exposed upon the coast of Yorkshire, although the evidence of geological position appears to be satisfactorily determined, they possess but few mineral features which serve to connect them with their supposed equivalents in Gloucestershire, Wiltshire, and Somersetshire; they constitute a great carboniferous deposit of the Oolitic period, abounding with land plants, and containing intercalated bands or thin beds of dark gray argillaceous shales, limestones, and sandstones, containing marine shells, of which only a minority of species have been identified in other localities. The evidence afforded by the few species of univalves which have been forwarded to the authors from Scarborough, through the kindness of Mr. Bean, though not conclusive, tends rather to assimilate them with the Inferior Oolite; and it will be perceived on consulting the table of species at the end of the Monograph, that of the twenty-one Yorkshire species, none have been identified with Great Oolite shells of Minchinhampton or Ancliff, but that seven agree specifically with Inferior Oolite shells of the Cotteswold hills. The Yorkshire deposits to which these remarks refer constitute the entire series of plant-bearing beds numbered 11, 12, and 13 in Phillips's 'Geology of Yorkshire,' reposing on No. 14, or the Dogger, which is proved by its fossils to be the equivalent of the Inferior Oolite, or at least to a portion of that formation. Admitting, therefore, the parallelism of the deposits containing somewhat distinct Faunas, in the north-eastern and south-western parts of the present area of England, we are naturally led to infer, either that the physical conditions might be favorable to the continuance of species in one locality, or that species characteristic of an older deposit, in a more distant region, may have migrated and lived on during the formation of a newer deposit in another, the conditions having become unfavorable to the perpetuity of their development in the latter deposit over the original region whence they had migrated.[2]

For the above-mentioned reasons, it has been deemed desirable to separate the

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[1] The section at Ancliff, near Bradford, is as follows:

Rubble	5 feet.	Abounding with Polyparia.
Soft Oolite	15 ,,	This is the bed celebrated for the Ancliff fossils.
Clay	1 ,,	Containing small sponges, and many fragments of shells.
Rag	6½ ,,	Very coarsely Oolitic.
Soft Oolite	5 ,,	

From Mr. Lonsdale's interesting memoir, "On the Oolitic District of Bath," in the 'Geol. Trans.,' vol. iii, p. 252, in which many other sections of the Great Oolite are given, and the range of the deposit in that neighbourhood is accurately traced.

[2] Unfortunately the entire character of the fauna of the Great Oolite in the centre of England is not well ascertained, nor is the range and extent, southerly, of the fluvio-marine conditions of the Yorkshire Oolite accurately determined. As bearing on this point, the reader is referred to a paper by Captain L. L. B. Ibbetson and Mr. Morris, "On the Geology of Stamford" ('Brit. Assoc. Rep.,' 1847, p. 127). The subject of migration of species, during the Oolitic epoch, is ably treated in a valuable memoir by M. Gressly, 'Observations Geologiques sur la Jura Soleurois.'

Yorkshire shells from those of the West of England, and to have them figured on separate plates, as by this arrangement it is trusted that confusion will be avoided, whatever may ultimately be determined with regard to the position of these deposits.

It will be observed that several characteristic groups of shells have been arranged into new genera and sub-genera, the knowledge of which, it is believed, will conduce materially to the identification of the members of the lower Oolitic system of rocks; of these Ceritella, Brachytrema, Alaria, Cylindrites, and Trochotoma, are likewise represented in the Inferior Oolite, but by other species; in no instance has any species of these genera been found common to the two formations. Other genera occur whose species are equally characteristic of the two formations; the table of comparison at the end of the memoir will indeed serve to show how small a number of the spiral univalves are really common to both formations; with the Patelloidea the case is somewhat different, but the entire number, excluding the Yorkshire species, is very small; a fact the more worthy of notice as a much larger number of the bivalves are common to both, or if capable of being separated, can only be regarded as sub-species, or varieties of the same species. The literature of the science has hitherto been singularly deficient in illustrations of English Great Oolite univalves; Lhwyd's 'Lithophylacii Britannici Ichnographia' contains a few; Conybeare and Phillips, in their 'Geology of England and Wales,' p. 210, enumerate three species. Sowerby's 'Mineral Conchology' contains thirteen, one only of which is from the Minchinhampton district. Mr. Lonsdale's paper on the 'Oolitic district of the neighbourhood of Bath' has only three identified species. In Prof. Phillips's 'Geology of Yorkshire,' (part I, p. 123,) fifteen species of univalves are enumerated, which are reproduced in Mr. Williamson's paper on the 'Yorkshire Oolites,'[1] but without descriptions. Dr. Fitton's notice of the strata at Stonesfield[2] gives an accurate enumeration of the different beds, but with few organic remains. In the paper by Capt. L. L. B. Ibbetson and Mr. Morris, on the 'Geology of Stamford,'[3] a few univalves are mentioned; and, lastly, in the 'Geology of Cheltenham,' edited by Messrs. Strickland and Buckman, a list is given from the Stonesfield slate of East Gloucestershire of six Echinodermata, or at least fragments of them, and nineteen gasteropoda, remains of which, however, are sometimes very imperfect.[4] It may be

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[1] Geol. Trans., 2d Ser., vol. v, Part i, p. 240.

[2] Zool. Journal, vol. iii.

[3] Brit. Assoc. Reports, 1847.

[4] The following is a section of the quarry on Sevenhampton Common, whence most of the fossils were obtained:

Soil	2 feet.	
A yellow clay, of a somewhat soapy feel, very rich in fossil shells .	6 ,,	
Ragstone, similar to the Stonesfield slate . . .	— ,,	4 inches.
Thin seam of soft stone, with Ostrea acuminata, and small joints of Apiocrinites	— ,,	3 ,,
Blue marl	8 ,,	
Ragstone	14 ,,	
Stonesfield slate	4 ,,	
Fullers-earth	— ,,	

gathered from these details, that in undertaking the present work, the authors have necessarily, to a great extent, entered upon an unexplored field of study,—have been compelled to investigate the relations of forms which, in very many instances, have only recently been brought under their notice, and respecting whose analogues some doubt or difference of opinion may occasionally exist: with a sincere desire to avoid error, they have in every instance rejected species of which the examples were imperfect or doubtful.

It is with pleasure and gratitude they acknowledge the assistance which they have received in the prosecution of their task, and their thanks are especially due to Professor Edward Forbes, for his valuable memoir on the Echinodermata; to D. Sharpe, Esq., for his copious notes on the Nerineæ, and other valuable suggestions; to Wm. Bean, Esq., of Scarborough; to M. Bouchard, of Boulogne; to Professor Tennant, F.G.S.; to S. V. Wood, Esq., F.G.S.; to Professor Buckman; to — Bravender, Esq., of Cirencester; and to J. Bentley, Esq., of Stamford, for the loan of specimens for comparison and figuring: to M. A. Buvignier, of Verdun, for his little work on the 'Oolitic Fossils of the Ardennes;'—also for the opportunities afforded them in consulting the important collections of the Viscomte D'Archiac; J. Baber, Esq., F.G.S.; J. S. Bowerbank, Esq., F.R.S.; J. G. Lowe, Esq. of Chippenham; Rev. P. B. Brodie, F.G.S.; E. H. Bunbury, Esq., M.P., F.G.S.; S. P. Pratt, Esq., F.R.S.; and to Professor E. Deslongchamps, of Caen, for his obliging kindness in forwarding to them a suite of specimens typical of some of the species figured by him in a series of memoirs, containing many valuable observations, published in the seventh and eighth volumes of the 'Mémoires de la Société Linnéenne de Normandie;' as well as to J. de Carle Sowerby, Esq., for the loan of many of the original specimens described in the 'Mineral Conchology;' and to G. R. Waterhouse, Esq., and S. P. Woodward, Esq., for the facilities afforded to the authors in their examination of the species contained in the National Collection. To the artists, Messrs. Bailey and C. R. Bone, of the Ordnance Geological Survey, the authors tender their acknowledgments for the pains they have taken in the general accuracy of the lithographs.

A MONOGRAPH

OF THE

MOLLUSCA FROM THE GREAT OOLITE.

GENERAL GEOLOGICAL REMARKS.

The Minchinhampton district of the Great Oolite has produced by far the greater number of our illustrative specimens; and as the formation at that locality exhibits features of a very varied as well as comprehensive character, we may be excused for entering somewhat more into detail in our remarks upon it. The Great Oolite in this portion of Gloucestershire constitutes the uppermost rock of the Cotteswold Hills; it everywhere overlies the Fullers-earth, which, in turn, reposes upon the uppermost beds of the Inferior Oolite;—there is, therefore, a regular unbroken sequence of the Oolite rocks exposed on the flanks of the various deep valleys of denudation which pervade the district. The physical features of the district are strongly marked; the larger valleys have a mean depth of about 500 feet, and exhibit what can scarcely be met with in any other part of England; a single unbroken declivity comprising the Great Oolite, Fullers-earth, Inferior Oolite, and upper portion of the Lias. The Inferior Oolite at these escarpments has a thickness of about 230 feet, the Fullers-earth of 70 feet, and the different beds of Great Oolite of 120 feet; but of these latter, only about the lower 40 feet anywhere approach to the brow of the escarpments. The narrow and deep vale of Chalford, with its lateral branches, intersects the strike of the Great Oolite, and divides the fossiliferous portion of the district into two parts; another and wider valley, further south, likewise intersects the strike of the formation. In this are situated the villages of Woodchester, Hailsworth, and Avening; but here the amount of denudation, horizontally, has been more extensive; and as the Great Oolite is likewise much less fossiliferous, it need only be adverted to as supplying many additional positions, where the rock can conveniently be quarried by open-work excavations. It will, therefore, be perceived that the natural features of the district eminently conduce to the study of its organic remains.

The mineral masses which constitute this series of beds are exclusively of marine origin, the varying character of their organic contents being connected both with the mineral character of the deposit spread upon the floor of the ancient sea, and with its depth. These deposits may be conveniently divided into three groups:

1st. The Weatherstones; 2d. The Sandstones; and 3d. The Limestones.

The weatherstones, which are situated at the base of the formation, average about 40 feet in thickness. They consist of shelly sandstones, abounding with crystalline carbonate of lime, and having Oolitic grains irregularly and sparingly distributed throughout their mass. The variety of mineral character is so great, that no two quarries, or beds of the same quarry, or even distant parts of the same bed, are alike in structure, aspect, hardness, durability, or in the abundance of their included organic relics; and they appear to have constituted a deposit both littoral and formed in a shallow sea, exposed to the influence of tides and currents. The beds, which are sometimes of considerable thickness, consist of layers of testacea, in a fragmentary state, piled confusedly, but forming, obliquely, laminated surfaces, often interrupted and crossed by others which proceed in different directions. The shelly relics often constitute a considerable proportion of the whole mass; they are converted into crystalline carbonate of lime, which frequently fills the interior of the univalves; and it is to the abundance of this mineral, disseminated everywhere, that the weatherstones owe their superior durability upon exposure to the atmosphere. As a general rule, therefore, the beds which contain the greatest abundance of shells are those which are most fitted to resist the action of frost; water percolates their structure in much smaller quantity, and more slowly, and, on escaping, carries away but little lime in solution. The open joints of the Great Oolite, adjacent to the shelly beds, are therefore nearly free from the large stalactitical masses which load the joints of the freestone in the Inferior Oolite.[1] With the testaceous fragments are associated shells in a perfect condition, though frequently worn and abraded, the valves of the conchifera being rarely in apposition; also, palatal bones and teeth of fishes, portions of crustacea, spines of cidaris, ossicula of pentacrinites and asterias, rolled fragments of zoophytes, and dicotyledonous wood, the partitions of the beds disclosing not unfrequently the ripple-marks of a beach. It might be imagined that beds of such a littoral character would be unsuited to the propagation and development of the Cephalopoda; and it will occasion no surprise when we find that examples of this class of carnivorous mollusks are here few, both as to number of species and of individuals. This fact, together with the circumstance that they do not mark any particular stratum, renders it highly probable that they were not associated, when living, with the denizens of these shelly beds, but, like dead shells of the recent Spirulæ, individuals occasionally floated upon the surface, and were wafted to some coast or shelly strand, often very distant from their real habitat. With the chambered shells such occurrences may have been common; the air-tight little vessel, separated by decomposition from the animal, would ride upon the wave, and only suffer injury upon striking the ground of the beach. A consideration of the gregareous habits of the several families of recent, and probably also of extinct Cephalopoda, would lead us to regard an occasional stray individual as having travelled from some colony more or less distant; but the beds of closely-packed Ammonites, of every stage of growth, which occur in certain of the Jurassic rocks, would appear to be the effect of occasional rapid earthy deposits, which took place during that seasonal period when the Mollusks, lying torpid and contracted within their shells, were at once entombed in that condition. We have also an explanation of the perfect condition which the Ammonites of these beds usually exhibit; the place of retirement would be exempt from the turbulence of a shallow sea, and exposed only to the deposit of mud or other fine sediment, which would protect the shells from injury. In the few Ammonites and Nautili of the weatherstone beds, we see the reverse of these conditions;—those large and fragile shells, exposed in that detrital deposit to every kind of attrition and accident, are very rarely perfect; seldom more than two continuous chambers can be found which have not been invaded by earthy sediment, and often large portions of shell are wanting altogether. The paucity of the Brachiopoda in these beds is also worthy of notice. Three species of Terebratula are found associated with nearly 400 species of Mollusks; and certain genera, which are peculiarly prominent in the Oolitic rocks generally, are mostly absent; of these genera, the Pholadomyæ, Homomyæ, Cercomyæ, Myopsides, Gresslyæ or Pleuromyæ, the Arcomyæ and Ceromyæ, being exceedingly rare. The greater number of these genera are not uncommon in the limestones or upper beds of the Great Oolite, and occasionally, also, in the lower beds or sandstones, when they are separate from any shelly deposit.

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[1] For economic purposes, the weatherstones are valuable on account of their durability. In proof of this, we may refer to the good state of preservation which the ancient part of the church at Minchinhampton exhibits, and which shows a care and judgment in the selection of materials not always to be found in modern edifices. It is rather a singular fact, that Caen and Minchinhampton, the two places which have produced by far the most extensive series of Great Oolite shells, are connected historically as well as geologically. Matilda, wife of William the Conqueror, founded the nuns of the Holy Trinity at Caen, of which body one of her daughters became a member. William endowed them with the manor of Minchinhampton, at which place they had a religious establishment. They built the church, and dedicated it to the Holy Trinity. It would seem that William despoiled the Saxon Countess Goda of the manor, which she possessed in the time of Edward the Confessor, and bestowed it upon the favorites of his wife.

The section of the shelly beds, exhibited by the great quarry upon Minchinhampton Common, affords a clear view of their distinctive characters and order of superposition. The upper part consists of thinly-laminated stone, five or six feet in thickness; to this succeeds the beds usually termed planking, a designation implying a thin bedded stone, but occasionally consisting of beds of great thickness: fourteen feet would appear to be their utmost thickness. They mark the downward limit of our new genus Purpuroidea, in the lowest bed of which it is very abundant.

An uncertain and variable stratum, of a few inches, of sandy marl next succeeds, in which the few casts of bivalve shells hitherto found have the valves in apposition. To this succeeds thin-bedded yellowish sandstones, nearly destitute of shells, and worthless for economic purposes: their thickness is about twelve feet. A soft, shelly sandstone, called *oven-stone,* next occurs: the shells increase in quantity downwards: about six feet will represent its thickness. To this succeeds the weatherstones, consisting of several beds, the aggregate thickness of which is about six feet. These lower beds are very shelly; but, owing to the greater hardness of the matrix, specimens cannot be extracted in any considerable number. The blue or brown clays of the Fullers-earth support the weatherstones, without any appearance of Stonesfield slate. It is also absent in several other limited shelly deposits; but, as a general rule, throughout the district, the Great Oolite, near to its base, has one or more beds, which possess all the essential characters of Stonesfield slate. A little higher in the series than the shelly beds, the limestones occur which cover continuously a very considerable area upon both sides of the vale of Chalford, and continue upwards, with various modifications of character, even to the Bradford clay. The lowest of this series is a very compact cream-coloured semi-siliceous, but argillaceous limestone, four feet thick, divided into two beds. It is usually destitute of organic remains; but in some localities contains casts of species of Purpuroidea, of several species of Natica; and, also, at a single locality, a dense colony of our new genus Pachyrisma, which has not hitherto been found in any other stratum. This limestone extends even to the vicinity of Cirencester, and was employed by the Romans to form tessaræ for their pavements, as noticed by Messrs. Buckman and Newmarch, in their new work on Corinium.[1] The base line of the white limestone is 60 feet above the Fullers-earth at Minchinhampton, and 45 feet, four miles to the east of that place, near to the railway (Sapperton tunnel); the measurements have been obtained by well-sinkings. Above this rock occurs a series of pale brown or chocolate-coloured limestones, sometimes compact, sometimes sandy, having between them an occasional uncertain band of marly clay. These clays are always fossiliferous, abounding in casts of bivalve shells, which have both valves generally united. The uppermost 40 feet of this series, owing to the worthless character of the stone, is very imperfectly exposed, our knowledge of it being chiefly derived from pits of no great size, opened for the repair of the roads. The eastern extremity of the railway tunnel (Sapperton) offers an extensive section of these beds, but their position does not allow of their being studied, except at a distance. The white limestone is exposed about the middle of the section. One of the road-side excavations, two miles east of Minchinhampton, and 90 feet above the Fullers-earth, has two beds of sandy limestone which is more than usually fossiliferous, they expose sections of Nerinea, Pterocera, Natica, Cylindrites, Bulla, Purpuroidea, several of the Echinodermata, &c. The bivalves, which are more numerous, comprise Pholadomya, Homomya, Ceromya, Lucina, and Cercomya. The shell is preserved in the condition of crystalline lime, but the interior mould only can be extracted entire. At three miles and a half east of Minchinhampton, a large excavation has a band of brown clay, which abounds with *Terebratula maxillata,* being almost the only fossil. This band is 115 feet above the

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[1] 'Illustrations of the remains of Roman art in Cirencester, the site of Antient Corinium,' by Professor Buckman, F.G.S., and W. C. Newmarch. London, 1850.

Fullers-earth. In another direction, one mile south-east of the town, is a marly band, containing a dense colony of a species of Terebratula, which is likewise the sole fossil observed. This isolation of the Terebratulæ is worthy of notice; they occur but as a few stray individuals in the shelly beds of the formation: in one instance, indeed, a shelly quarry at Bussage, a little to the north of the vale of Chalford, contains a large assemblage of a smooth, undescribed species, but at that place the other genera suddenly disappear, and the Terebratulæ are either alone or accompanied only by a few small bivalve shells. The Bradford clay, marked by the Terebratula digona, has not been discovered nearer than the cuttings at the Tetbury road station, eight miles distant. The Great Oolite has now been traced upwards throughout the Minchinhampton district, but there yet remains a subdivision of the formation to be noticed; this consists of sandstones, nearly worthless for economic purposes, and of but little interest to the Palæontologist; they constitute the entire series of beds which underlie the limestones, and usually terminate downwards in Stonesfield slate, or have one or two beds which approach the slate in mineral character. These sandstones must be regarded as merely continuations of the Weatherstone beds, but are nearly or quite destitute of shelly detritus and crystalline structure; for it is a curious but undoubted fact that the shelly weatherstones never have the limestones incumbent upon them. All the quarrymen are aware of the fact from the experience which they have gained in the numerous trials for weatherstone. At Bussage an instance may be seen of a weatherstone quarry passing into a worthless sandstone on approaching the area covered by the limestone; occasionally, indeed, the sandstones disclose a cluster of Pholadomyæ, and in the vicinity of the Stonesfield slate contain some other bivalves which are never found in the shelly beds. Occasionally over some small areas good serviceable quarries of weatherstone are worked in situations where scarcely a single perfect shell can be procured; there is then a dense, finely comminuted, shelly detritus, and the rock abounds with calcareous spar, and becomes thick bedded; several quarries of this description have been worked in the parish of Avening with good success; in this condition the rock presents an exact counterpart to the *general* aspect of the freestone beds in the middle portion of the Inferior Oolite in Gloucestershire, except that perhaps in the latter formation the oolitic grains are rather more abundant.

One of the most forcible impressions conveyed to the mind by a survey of the testacea of this formation, when compared with that of the other members of the oolitic system, is the great scarcity of the Cephalopoda, so few indeed are they, that the entire number procured during the last twelve years may almost be counted. For this scarcity we think we can perceive a compensation in the appearance of several genera of zoophagous gasteropods, in such numbers as must effectually have checked any undue predominance which might have been acquired by the phytiphagous mollusca, in the absence of the Cephalopoda. When the Phasianellæ and Naticæ, which are now known to be zoophagous, are added to our species of flesh-eating mollusca, it will at once be perceived how amply nature provided for the maintenance of the balance of the testaceous animals during the deposition of the Great Oolite of England. The great mass of the testacea are bivalves, and in species they exceed, by about one fourth, the united number of the Gasteropoda, Cephalopoda, and Echinodermata.

SUB-KINGDOM—MOLLUSCA.

Class—Cephalopoda. *Cuvier.*

Cephalopodes, *Lamarck; Férussac.*
Cephalophores, *De Blainville.*

The remains of the Cephalopodous mollusca may generally be considered of extreme rarity in the Great Oolite, in proportion to their abundance in the Inferior Oolite, and Lias below, and the Kelloway rock and Oxford clay above that formation. Limited, however, as the numbers were of the class at this particular period, the two principal orders into which naturalists have divided the Cephalopoda, viz., the Dibranchiata and Tetrabranchiata, were at that time fairly represented in the Nautilus, Ammonite, and Belemnite, the two latter genera being well known as typical and characteristic of the secondary period of geologic history.

Class.[1]	Order.	Group.	Family.	Genus.
Cephalopoda.	Dibranchiata.	Oigopsidæ.	Belemnitidæ.	Belemnites.
	(Acetabulifera, D'Orb.)			
	Tetrabranchiata.		Nautilidæ.	Nautilus.
	(Tentaculifera, D'Orb.)		Ammonitidæ.	Ammonites.

Order—Dibranchiata. *Owen.*

Family—Belemnitidæ.

Belemnites, *Ehrhart*, 1727. *Lam.*, *Blainv.*, *Voltz*, *D'Orb.*, &c.

Nautilus Belemnita, *Gmelin.*
Acamas, Achelois, Callirhoë, Cetocis, Chrysaor, Hibolithes, Paclites, Porodragus, Thalamus, *De Montfort*, 1808.
Notosiphites, Gastrosiphites, *Duval.*
Belemnites, Pseudobelus, *Blainville*, 1827.
Belemnita, *Fleming*, 1828.

An elongated, conical, or fusiform body, of a radiated fibrous structure (the *osselet, or guard*), solid posteriorly, and more or less pointed (the *rostrum*); anteriorly produced, truncated and furnished with a deep conical cavity (the *alveolus*), containing the distal portion of a horny or fibro-calcareous chambered shell (the *phragmacone*), perforated on the ventral part by a marginal siphuncle, and from the dorso-lateral margins of the anterior extremity of which shell proceed two elongated, slender, testaceous processes; the whole body being invested with a thin, testaceous, or corneo-calcareous integument (the *capsule*, or *periostricum*).[1]

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[1] For a concise and interesting account of the general characters and classification of the Cephalopoda, the reader is referred to a previous Monograph, by Mr. F. Edwards, 'On the Eocene Mollusca,' Part I, Cephalopoda.

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[1] On the subject of the Belemnite and allied forms, the reader is referred to the Memoir by Professor Owen, in the 'Phil. Trans.,' 1844, p. 65; and the interesting papers in the same work, by G. A. Mantell, Esq., LL.D., 'Phil. Trans.,' 1848, p. 171, and 1850, p. 393; also to the 'Paleontologie Française, Terrains Jurassiques,' p. 40, by M. A. D'Orbigny.

In corroboration of the interesting facts cited by Dr. Mantell, respecting the continuation of the phragmacone of the Belemnite, we quote the following graphic statement of a writer of the last century as bearing on the subject. The remarks are contained in an account descriptive of the sinking of a well at Montbard, in 1774.

"There were, moveover, great numbers of Belemnites, all conical, the largest being from 7 to 8 inches long. They were pointed like an arrow at one end, and the other terminated irregularly, and was flattened, as if they had been crushed. They were brown, both on the outside and inside, and were formed of a material, arranged internally in transverse or radiating striæ, which met at the axis of the Belemnite. This axis was, in all, rather eccentric, and marked from one extremity to the other by a fine white line. Whenever the Belemnite attained a certain size, the base contained a small cone, more or less long, made up of cells, in the form of plates set one within the other (as in Nautili). The white line ended at the summit of the cone. This small cone was invested along its whole length by a yellowish crustaceous pellicle, extremely thin, although composed of several layers; and the body of the Belemnite (with a radiating structure), which enclosed the whole, became thin in proportion as the diameter of the cone increased. Such, generally, was the character of the Belemnites which were found mingled with the soil thrown out of the shaft, and which character is common to all those of this species. In order to ascertain the position which the Belemnites occupied in the beds, several portions were softened carefully, and it was found that they all laid flat, and parallel with the beds. What most astonished us, and what has not hitherto been noticed, was this, that we then perceived, that to the extremity of the base of all the Belemnites, was attached an appendage of a yellowish colour, composed of a substance like that of the shells, and which was shaped like the widened part of a funnel which had been flattened. Many of these were two inches long, one inch broad at the further end, and about six lines at the point where they were attached to the Belemnite. In examining closely this shelly or crustaceous prolongation (which was so delicate that it could scarcely be touched without breaking), I observed that this part of the Belemnite, which has not hitherto been recognised, is nothing more than the continuation of the thin shell or crust which covers the little chambered cone, of which I have already spoken; so that it may be said, that all Belemnites which are at present to be found in collections of Natural History are imperfect; and that the portion we are acquainted with is only, as it were, the case or covering of a portion of the shell which at one time enclosed the animal."

Buffon, 'Epochs de la Nature,' iii, Epoch 5, p. 143.

'Historie des Mineraux, des argiles et de glaises,' vi, p. 122.

The above passage is translated from the 'Explication de la Carte Geologique de France,' tom. 2, p. 350.

BELEMNITES FUSIFORMIS, *Park.* Plate I, figs. 6, 8.

BELEMNITES FUSIFORMIS, *Park.* Org. Rem. iii, p. 127, t. 8, f. 13, 1811.
— — *Miller.* Geol. Trans., 2d Series, ii, p. 61, t. 8, f. 22, t. 9, figs. 5, 7.
— — *Brown.* Illust. Foss. Conch., p. 41, t. 29, f. 14.
— — *Flem.* Brit. Anim., p. 240.
— FLEURIAUSUS, *D'Orb.* Pal. Franç. Terr. Jur., p. 11, t. 13, figs. 14-18.
— — *Buckman.* Geol. of Chelt., t. 3, f. 9.

B. Testâ elongatâ, gracili, anticè compressâ, attenuatâ, posticè depressâ, acutissimâ subtus longitudinaliter sulcatâ, sulco posticè, anticèque non interrupto; aperturâ compressâ. (D'Orb.)

An elongated, smooth, somewhat fusiform Belemnite, somewhat compressed anteriorly, and depressed posteriorly, terminating in a rather sharp point; marked throughout the whole length by a deep single uninterrupted furrow, slightly enlarged towards the point of the rostrum. Alveolar cavity occupying about a fourth of the length. There is some slight confusion respecting this species, which is undoubtedly the shell alluded to by Parkinson in the work above cited, and described by Miller as coming from the Stonesfield slate, near Woodstock. The specimens figured (Pl. I, figs. 6—8), are from that locality. It appears also to be identical with the *B. Fleuriausus*, D'Orb., which is found in the Great Oolite in the environs of Luçon (Vendée). We are further confirmed in this opinion by the fact that Professor Buckman has identified and figured, in the work above referred to, a Belemnite under the name of *B. Fleuriausus*, as occurring in the Stonesfield slate of Gloucestershire, which is identical with our shell from the same deposit in Oxfordshire, the latter being the original locality from which the species was first obtained. The confusion appears to have arisen from the English specimens having been confounded with the *B. hastatus*, Blainville (*Hibolithes*, Montfort), from the Oxford clay, at least it is so quoted by M. D'Orbigny ('Pal. Franc. Terr. Jur.' p. 121), and also by Bronn ('Index Palæontolog.,' p. 156), an opinion that Mr. Miller may possibly have induced, inasmuch as he also considered De Montfort's species to be synonymous with the *B. fusiformis*.

Locality. The Stonesfield slate of Stonesfield; and Eyeford near Cheltenham.

BELEMNITES BESSINUS, *D'Orb.* Plate I, figs. 5, 7.

BELEMNITES BESSINUS, *D'Orb.* Pal. Franç. Terr. Jur., p. 111, t. 13, f. 14-18.
— CANALICULATUS, *Buckman.* Geol. of Chelt., p. 71, t. 3, fig. 8.

B. Testâ elongatâ, anticè compressâ, posticè depressâ, subtus longitudinaliter sulcatâ, sulco posticè interrupto, aperturâ compressâ. (D'Orb.)

An elongated, smooth, very slightly fusiform shell anteriorly compressed, posteriorly depressed, marked throughout the whole length by a furrow which is wider, and slightly divided towards the point.

The specimen figured appears to be the same as the *B. Bessinus*, D'Orb., from the Inferior Oolite of Port-en-Bessin (Calvados); the general proportions are similar, about eight times as long as wide, and the division of the furrow may be faintly traced in some specimens. It is probably identical with the shell figured by Professor Buckman (loc. cit.) as *B. canalicatus*, Schlot., but that species is stated by M. D'Orbigny to have an equally impressed furrow, whereas, in our specimens, it is always expanded towards the point of the rostrum.

Locality. The Stonesfield slate of Stonesfield, and Sevenhampton near Cheltenham.

ORDER—TETRABRANCHIATA. *Owen.*

Family—NAUTILIDÆ.

NAUTILUS, *Linnæus.*

BISIPHITES, OCEANUS, *De Montfort.*
OMPHALIA, *De Haan.*
NAUTILITES, *Schlotheim.*

A discoidal, convoluted, multilocular shell, compressed or ventricose, with contiguous volutions, the last one generally concealing the others, septa transverse, concave, and sometimes sinuous, with entire margins, more or less centrally perforated in their disc.

NAUTILUS DISPANSUS. Plate II, figs. 5, 5*a*.

N. Testâ subglobosâ, latè umbilicatâ, anfractibus rotundatis, lateraliter subcarinatis; aperturâ dilatatâ, subovali; septis (?), *siphunculo* (?).

A somewhat globose and smooth shell, with rapidly increasing volutions, and a large and rather deep umbilicus, exposing the previous volutions; umbilicus occupying about one third of the diameter of the shell; volutions rounded on the back, and slightly carinated towards the base by the obliquely flattened form of the outer margin of the umbilicus. Aperture expanded, arched, semi-ovate, wider than high.

Septa and Siphuncle not visible in the specimen described.

Diameter of the aperture . . .	6½ inches
Height of the " . . .	3½ "
Volutions increase in size (increasing about ⅔ in the volution), from	2¼ to 6½ in.
Height of re-entering volution . .	1 "

This species is closely related to *N. excavatus*, Sow., 'Min. Con.' tab. 529, f. 1, from the Inferior Oolite of Dorsetshire; but it is readily distinguished from it by the more oval form of the aperture; the width of the umbilical opening, in proportion to the diameter, is also different, being in *N. dispansus* about one third, and in *N. excavatus* about the half of the diameter of the shell; the form also of the umbilical cavity varies in the two species; in *N. excavatus,* the sides of the cavity are regularly conical, as shown in Mr. Sowerby's figure, above quoted, and in the 'Pal. Fran. Terrains Jurassiques,' t. 30; in *N. dispansus* the outer margin of the umbilicus is obliquely flattened, or subconical, the inner side being rather steep.

A single specimen only has been found of this species in the shelly beds of the Great Oolite near Minchinhampton.

NAUTILUS BABERI. Plate I, figs. 1, 1*a*.

N. Testâ discoideâ, compressâ, lævigatâ, subumbilicatâ; anfractibus angulatis, compressis; aperturâ compressâ subquadrata; septis vix sinuosis; siphunculo (?)

A compressed, smooth shell, or only slightly marked by the lines of growth, with angular embracing volutions, leaving but a faint trace of an umbilical cavity; aperture somewhat quadrilateral, narrowed above, and wider than it is long; the septa are slightly sinuous, curving towards the umbilicus and outer margin.

This species is allied to *N. truncatus,* Sow., from the Lias, but is distinguished by the form of the mouth, and character of the septa.

Locality. Great Oolite near Minchinhampton.

We have much pleasure in dedicating this species to our friend, James Baber, Esq., of Knightsbridge, whose interesting collection of fossil remains is always liberally opened to public view.

NAUTILUS SUBTRUNCATUS. Plate I, figs. 2, 2*a*.

N. Testâ discoideâ, inflatâ, lævigatâ, sulcatâ, subimperforatâ; anfractibus rotundatis (*jun.*), *subangulatis* (*adulta*)*; aperturâ depressâ, subquadratâ; septis* (?), *siphunculo* (?).

A smooth, or slightly furrowed, and somewhat inflated shell, with rounded and embracing volutions in the young state, which become truncate, or subquadrate, in the adult, and having a very shallow, or slightly impressed, umbilicus. Aperture about twice as wide as it is high, flattened above, and somewhat compressed laterally.

This shell has the general form of the *N. latidorsatus,* D'Orb. 'Terr. Jur.' t. 24, but the broad umbilicus and more quadrate form of the young shell in that species readily distinguish them. This species belongs to the section of imperforate Nautili, of which *N. truncatus,* Sow., *N. clausus,* D'Orb., are examples; a group, the species of which were not apparently very numerous during the Jurassic period.

Locality. Great Oolite near Minchinhampton.

ORDER—TETRABRANCHIATA.

Family—AMMONITIDÆ.

AMMONITES, *Brugiere.* 1789.

OPHIOPOMORPHITES, ***Plott.***
PLANORBITES, ORBULITES, GLOBITES, PLANULITES, ***Lam.***
AMALTHEUS, PLANULITES, ***De Montfort.***
PLANITES, GLOBITES, ***De Haan.***
NAUTILUS, ARGONAUTA, ***Reinecke.***
AMMONITA, ORBULITA (pars.), ***Fleming.***

A more or less discoidal, multilocular shell, with contiguous volutions; volutions generally visible, septa transverse, with sinuated edges, perforated by a single tube, situated close to the outer margin.

AMMONITES SUB-CONTRACTUS. Plate II, figs. 1, 1*a*, jun., figs. 2, 2*a*.

A. Testâ discoideâ, subglobosâ, costatâ, umbilicatâ, anfractibus involutis, rotundatis compressis, lateribus 16—18 *costatis, costis obtusis bi-trifurcatis, in dorsum continuis; aperturâ semiellipticâ subcontractâ; umbilico magno, excavato, subconica.*

A sub-globose, deeply umbilicated, and costated shell, with sixteen to eighteen obtuse ridges (tubercles?) surrounding the margin of the umbilical cavity, from each of which three or four smaller costæ pass over the somewhat depressed and rounded back. Aperture, semi-elliptical.

Proportion of umbilicus to diameter, rather more than one-half. Diameter, 5 inches. Thickness, 3 inches. Height of aperture, 1½ inches, twice as wide as it is high.

The specimen from which our figure is taken has been much worn by clearing it from the original matrix, but a careful examination discloses the prominent marginal costæ, as well as the smaller ones which arise from them and pass over the back.

In the umbilicus, the marginal costæ are well exhibited, which in the young state were more compressed, and continued on the inner side of the cavity.

This species is distinguished from the *Ammon. coronatus,* Brug., by its more globose form, less conical umbilicus, and the more arched and less expanded aperture. It is closely allied to *Am. contractus,* Sow., and in a young state might be mistaken for that species; but the ribs are larger and not so numerous or elevated; the less embracing volutions, and the more contracted form of the aperture in the adult shell, are also characters by which it may be distinguished.

Unfortunately the determination of the species, and their varieties of the Ammonites in the Great Oolite of Minchinhampton, is rendered extremely difficult, in consequence of the great rarity of specimens, and their state of preservation, rarely allowing the least trace of the sinuated edges of the septa to be observed.

Ammonites arbustigerus, *D'Orb.* Plate II, figs. 4, 4*a*.

Ammonites arbustigerus, *D'Orb.* 1848. Pal. Franç., Terr. Jur., p. 414, t. 143.
— — *D'Orb.* 1850. Prod. Paléont., p. 296.

A. Testá compressá, anfractibus rotundatis, latis, lateribus convexis transversim 22 *costatis; costis obtusis bi-trifurcatis vel intermediis, dorso sub-convexo; aperturá oblongá, compressá.*

A discoidal, costated shell, with somewhat convex and gradually increasing volutions; umbilicus large: the principal costæ are obtusely rounded, and about twenty-two in number, bifurcating as they pass over the back, having occasionally an intermediate rib; back convex; aperture oblong.

Locality. In the Great Oolite of Minchinhampton, and described by M. D'Orbigny as occurring both in the Great and Inferior Oolite of Normandy.

Ammonites macrocephalus, *Schloth.*, var. Plate II, figs. 3, 3 *a*.

Ammonites macrocephalus, *Schloth.* 1813. Min. Tasch. vii, p. 70.
— — *Schloth.* 1820. Petref., p. 70, No. 16.
— — *Zieten.* 1830. Pet. Wurtemberg, t. 5, f. 1, 4.
— — *D'Orbigny.* 1848. Pal. Franç. Terr. Jur., p. 430, t. 151.
— — *D'Orbigny.* 1850. Prod. Paléont., p. 127.

A. Testá discoideá, sub-globosá, anfractibus involutis, rotundatis, costatis: costis 20—30 *obtusis, medio laterum bifurcatis; aperturá semi-ellipticá; umbilico subcontracto.*

An inflated, or somewhat globose shell, with rather depressed volutions, and a narrow and deep umbilicus, from the margin of which arise about twenty to thirty obtuse ribs, which bifurcate in passing over the back. Back convex; aperture semi-elliptical.

We have ventured to assign our specimens to the *Ammonites macrocephalus* of Schlotheim, although their imperfect state of preservation renders this identification somewhat doubtful. The specimens of this species hitherto obtained by us from the Oolite, are always in the state of casts, and very much eroded, so that the principal ribs which surround the umbilical cavity, are nearly obliterated, as shown in the figure, tab. 2, fig. 3.

Locality. Great Oolite near Minchinhampton.

Ammonites gracilis, *Buckman.* Plate I, figs. 3, 3*a*.

Ammonites gracilis, *Buckman.* 1845. Geol. of Chelt., p. 104, t. 3, fig. 6.

A. Testá discoideá, compressá, anfractibus ovatis lateribus sub-complanatis, transversim 30—40 *costatis; costis bi-trifurcatis vel intermediis, in dorsum continuis, aperturá ovatá, sub-sagittatá.*

A discoidal, compressed, ribbed Ammonite, with six to eight oval, slowly increasing volutions, the last formed partly concealing the previous ones, with about thirty to forty rounded or obtuse and nearly straight ribs on the inner margin, which generally become bi- or trifurcate about the middle of the volution, and some pass over the back, giving it a costated appearance; the ribs, however, are not aways confluent, an intermediate one frequently arising about the middle of the volution; from the manner in which each volution is enveloped, the previous ones only exhibit the simple costæ, as seen in the specimen figured at Tab. I, fig. 3. The aperture is semi-ovate and compressed. The sinuosities of the septa are not to be traced with any degree of accuracy, but they appear generally to resemble those indicated by D'Orbigny. 'Terr. Jurass.,' t. 148. (*Am. Bakeriæ.*)

Differing as our figure[1] does from that given by Prof. Buckman in the 'Geology of Cheltenham,' we have no doubt of the identity of the specimens, having been enabled, through the kindness of that gentleman, to compare the original form. All the specimens we have examined of this species are more or less compressed, and this cause may have partly influenced the peculiar saggitate form of the aperture in the individual shell selected by Prof. Buckman for illustration.

The costæ which ornament this shell in the young state, and for a considerable period of its growth, become partially obsolete in a more advanced stage. Perfect specimens of this shell, showing the fact, are excessively rare, but we have collected large fragments of this species on Sevenhampton common, in which the character is clearly exhibited.

Locality. The specimen figured is in the collection of James Baber, Esq. F.G.S., and was obtained from the Stonesfield slate of Stonesfield. It also occurs in the same formation at Sevenhampton common.

AMMONITES WATERHOUSEI. Plate I, figs. 4, 4*a*.

AMMONITES DISCUS, *D'Orb.* Terr. Jurass., p. 394, t. 131.
— — *D'Orb.* Prod. Paléont., p. 296. 1850.

A. Testá compressá, sub-carinatá, anfractibus compressis, latis, externè angulatis; lævigatis; dorso acuto; umbilico angustato; badperturá sagittatá.

A compressed, discoidal shell, formed of very compressed and nearly embracing volutions; the inner half of the shell flattened and smooth; the outer, with obtuse, rather distant and flexuous costæ, terminating near the margin; keel acute; mouth sagittate.

This specimen, from the Great Oolite of Minchinhampton, agrees in all the characters with the *Am. discus*, figured and described by M. D'Orbigny, 'Terr. Jurass.,' pl. 131, and which is cited by that author as occurring both in the Great and Inferior Oolite of Normandy. We also possess the same species from the Inferior Oolite of Bridport and Gloucestershire. It differs, however, essentially from the original specimen of *Am. discus*, Sow., described in the 'Min. Conch.,' tab. 12, which has a more regular, sagittate aperture, and does not possess the central flattened space, so characteristic of our species.

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[1] Unfortunately the specimen figured illustrates only the young state or inner volutions of this species, not having received at that time the finer specimens belonging to Professor Buckman, and from which the following description was drawn up: "*A. gracilis.* Keel crenated; volutions six or seven, half concealed; ribs straight, passing over the back, and thus making the crenations of the keel; sometimes two or three ribs are confluent towards the front; diameter about 9 inches; thickness 1¼ inches; aperture sagittate." (Geol. of Chelt., p. 104.)

Locality. Great Oolite of Minchinhampton, *Lycett.* In the same formation at Ranville (Calvados), Niort (Deux Sèvres), Mansigny (Vendée), *D'Orbigny.* In the Inferior Oolite at Bridport, and near Stroud; Eterville and Moutiers (Calvados).

We have much pleasure in assigning to this species the name of G. R. Waterhouse, Esq., whose arrangement and careful study of the Cephalopoda, contained in the National Collection, have materially assisted this branch of Palæontology.

CLASS—GASTEROPODA. *Cuvier.*

ORDER—PROSOBRANCHIATA. *M. Edwards.*

CTENOBRANCHIATA, *Schweigger.*

Family—STROMBIDÆ.

PTEROCERA, *Lamarck*, 1801.

Shell turrited, ventricose, spire usually short, aperture oval, having a lengthened canal at both extremities, outer lip expanded into hollow thickened spines, with an anterior sinus separate from the caudal canal.

PTEROCERA IGNOBILIS. Plate III, fig. 14.

P. Testâ parvâ turbinatâ; spirâ breviusculâ; anfractibus lævigatis, planatis (3—4) *ultimo obsoletè transversim bicarinato; carinâ superiori obsoletè nodosâ; caudâ brevi.*

Shell small, turbinated, spire short, whorls smooth, flattened (3—4), the last whorl twice carinated, the upper carina obscurely nodulous, canal short.

The great breadth of the whorls, and the obscurely bicarinated last whorl, are the leading features. This shell approaches *Alaria lævigata;* but in that species the spire is much more lengthened, and the volutions do not become angular, until at least five have been completed, it then produces small processes, which are deciduous, and the last whorl does not attain any undue magnitude; but, in the species before us, the fourth volution is large, has considerable squareness, but with scarcely any distinct carina.

Locality. Rare in the planking of Minchinhampton Common.

PTEROCERA BENTLEYI. Plate III, figs. 15, 15*a*, var. fig. 16.

P. Testâ turritâ, anfractibus convexis, costis transversalibus (4); *anfractu ultimo permagno, et costato; labio externo palmato digitis quinque divaricatis; canali obliquo elongato.*

Shell turrited, turbinated, whorls convex, costated, costæ (4) transverse, last whorl very large and costated, the costæ terminate in an expanded palmated wing, digitations five in number, beneath which are numerous diverging lines which connect the wing with the caudal extremity.

The whorls are oblique in their upper and cylindrical in their lower portions; their encircling ribs are unequal and irregular; no other markings are preserved; but the condition of the specimens is scarcely so good as could be wished. The wing is enormously expanded; the spines extend a little beyond the connecting portions of the wing.

Locality. The Stonesfield slate at Collyweston has furnished the present specimens. The specific name in compliment to John F. Bentley, Esq., of Stamford, who has enriched our knowledge of the fossils of that locality.

ALARIA. *Nov. Gen.*

A. Testâ turritâ, alatâ et caudatâ, alâ integrâ vel digitatâ, interdum varicem formanti; canali posteriori nullo, labro sinistro tenui, nunquam calloso nec anfractum ultimum obtigenti, labro dextro interdum ultra anfractum ultimum extenso, canali anteriori producto aut breviusculo.

Shell turrited, winged, and with a caudal extremity, wing entire or digitated, sometimes produced into a thickening or varix, no posterior canal, left lip thin, never thickened, nor extended upon the penultimate whorl, right lip sometimes extended slightly upon the penultimate volution, anterior canal either produced and lengthened or short.

This genus is constituted to receive a numerous group of winged shells, which are separated from the true Strombidæ, Rostellariæ, and Pteroceræ by a simple but important distinctive character, viz. the absence of a posterior channel upon the spire. The greater number of our Great Oolite species of Strombidæ will be found to range themselves under this division of the family; the character of the wing is various, consisting either of a simple, undivided, and thickened process, or divided into two or more digitations; the channel, likewise, may be either short and straight, or lengthened and curved; the inner lip is always thin—usually effuse and scarcely visible, but never produced into a thickened posterior ridge, as in the true Rostellariæ; the wing, in some instances, is extended slightly upon the penultimate volution, which is its utmost limit.

Another character of some importance, first noticed by Mons. Deslongchamps, and which appears to characterise this group of shells, is this: the animal, after having developed the right margin of the shell, continued to increase in growth, and (like the species of *Murex* and *Ranella*) reproduced a second dilated and digitated margin, similar to the first, and generally opposite to it, a character rarely if ever found in the recent Pteroceræ or Rostellariæ.[1]

ALARIA ARMATA. Plate III, fig. 1, 1*a*.

A. Testâ turritâ, anfractibus carinatis, et angulato-nodosis, nodis prominentibus 6 *in ambitu. Anfractu ultimo gibbo, bicarinato; carinâ superiori prominentiori spinis acutis; in ætate juniori digitis tribus parvis; in ætate adultâ digitis superioribus duobus longissimus. Caudâ longâ curvatâ. Striis tenuissimis confertis transversis, plerumque obsoletis.*

Shell turrited, whorls carinated, angulated and carinated in their middle portion; nodules 6 in a volution. The last whorl has three carinæ, the last of which is nearly obsolete. In the young state it has three small digitations; when adult, the two superior carinæ are extended into very long digitations; the first carina having two angular prominences or spines. The entire surface of the shell has numerous fine encircling striæ, which for the most part are indistinct.

The acute spine, number of whorls, their prominently angular figure, together with the spine upon the middle of the superior carina of the last whorl, are characteristic features; from *A. hamus* and *A. Phillipsii* the character of the wing is sufficient to distinguish it.

Locality. The planking beds of Minchinhampton Common have furnished all our specimens; the coarse character of the deposit rarely allows the display of the fine striæ, or other features of much delicacy. It is moderately rare.

ALARIA HAMUS, *Desl.* sp. Plate III, figs. 2, 2*a*, 2*b*.

ROSTELLARIA HAMUS, *Deslongchamps.* 1842. Mém. Soc. Linn. Normandie, vol. vii, p. 173, pl. 9, figs. 32, 33, 34, 35, 36.
— — *Desh.* Lam. An. sans Vert., 2d Edit., 1843, tom. 9, p. 666.
PTEROCERA HAMUS, *D'Orb.* 1850. Prod. Paléont, p. 270.

A. Testa turritâ, anfractibus transversè striatis, medio angulato-nodulosis, nodulis plus minusve crebris, ultimo anfractu gibbo, bicarinato, carinâ superiori majori; aperturâ trigonâ. Carinâ majore ultimo anfractu nodulosa, nodulis parvis, subobsoletis. (Deslongchamps.)

Shell turrited, whorls transversely striated, having a circle of nodules somewhat angulated in their middle part, the nodules being more or less closely arranged. The last whorl is large; it has two carinæ, the first of which is much the larger, and is indented or formed into closely arranged nodules, which are sometimes nearly obsolete.

In some specimens, the larger carina is quite smooth, in others the indentations are oblique; the canal is short and straight.

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[1] Mém. Soc. Linn. de Normandie, vii, p. 171, 176. Lam. Anim. sans Vert, 2d Edit., p. 671.

Locality. The planking of Minchinhampton Common and white stone of Bussage contain it; but at the latter place the more delicate features are usually best preserved. It is rather rare. Inf. Oolite, Bayeux; Great Oolite, Ranville, Normandy. (*Desl.*)

ALARIA LÆVIGATA. Plate III, fig. 3, 3*a*.

A. Testâ fusiformi, anfractibus convexis, lævigatis, ultimo bicarinato, carinâ superiori spinigera; spino oblongo ori opposito; alâ brevissimâ in ætate juniori monodactylâ, dein (ætate adulta) magnâ didactylâ, digitis longis divaricatis, tenuibus, trigonis; caudâ longâ, rectâ, apice sub-incurvo; aperturâ oblongâ, labro sinistro subcalloso.

Shell fusiform, whorls convex, smooth, the last whorl with two carinæ, the upper carina spined; the spine oblong, and placed opposite to the aperture; the wing very small when young, at first it has but one digitation, with advance of growth it acquires two large digitations, which diverge in opposite directions, they are smooth and three-sided; the caudal extremity is long and curved towards the apex; the aperture is oblong, the left lip being slightly thickened.

In everything, excepting its smooth surface, this shell agrees with the *Rostellaria myurus* of Deslongchamps; but as we have seen about twelve specimens, which were well preserved, it is impossible that they ever could have had the striæ which distinguish the shell from Normandy.

Locality. It is rare, and has been found only in the planking of Minchinhampton Common and contemporaneous beds of white stone north of the Vale of Brimscombe.

ALARIA HAMULUS, *Desl.* sp. Plate III, figs. 4, 4*a*, 4*b*.

ROSTELLARIA HAMULUS, *Deslongchamps.* Mém. Soc. Linn. Normandie, vol. vii, p. 175, pl. 9, figs. 37—40.
— — *Desh.* Lam. An. sans Vert., 1843, tom. 9, p. 666.
PTEROCERA HAMULUS, *D'Orb.* Prod. Paléont., p. 302.

A. Testâ parvâ turritâ, apice obtuso, anfractibus (5—6) *carinatis nodulosis; ultimo anfractu subgibbo, transversè striato; striis inæqualibus, majoribus alternatim minoribusque; carinâ nodulosâ seu plicatâ; labro externo incrassato variculam simulante; alâ parvâ unidigitato, apicè acuto trigono, subtùs canaliculato; caudâ brevissimâ, aperturâ subellipticâ.*

Shell small, turrited, clavate, apex obtuse, whorls (5—6) convex, nodulated, nodules six in a volution. The last whorl has a single nodulated carina terminating anteriorly in a slight digitation. In the immature state the digitation is produced into a hook-shaped process. The surface has numerous encircling striæ, somewhat irregular, but which are alternately large and small. The upper margin of each whorl has a prominent line closely tuberculated; the aperture is narrow, being contracted on the right side by a thickened fold or varix, of which there are two upon the last volution. The inner lip is broad and distinct, the channel is short and straight. A small canal passes from the aperture to the apex of the rudimentary digitation.

M. Deslongchamps has described this species from three small specimens, which are very imperfect, having only the last volution. The name is scarcely appropriate to full-grown individuals which nearly lose the hook-like digitation: in one instance only have we noticed the *hamulus* of the dimensions figured by M. Deslongchamps, and this occurred in the smallest of our specimens, which was but little larger than the Norman one. It would, therefore, seem that this feature was of an uncertain character, and disappeared at a later period of growth.

Locality. The beds of planking at Minchinhampton Common, and their equivalents, the white stone of Bussage and Eastcombs, have supplied all the specimens which have come to our knowledge. It is not very rare. In the Great Oolite (*pierre blanche*), Langrune, Normandy. (*Desl.*)

ALARIA PHILLIPSII, *D'Orb.* sp. Plate III, figs. 5, 5*a*.

PTEROCERA PHILLIPSII, *D'Orb.* 1850. Prod. Paléont, p. 270.
ROSTELLARIA COMPOSITA, *Phil.* 1835. Geol. Yorksh., i, t. 9, fig 28, (not Sow.)

A. Testá turritá; spirá elongatá; anfractibus numerosis, convexis, vel subangulatis, transversè striatis, et costis obliquis numerosis approximatis; anfractu ultimo bicarinato; alá unidigito, caudá rectá, breviusculá.

Shell turrited; spire elongated; whorls numerous, convex, or subangulated, transversely striated, and ornamented with numerous closely-arranged oblique ribs upon the lower half of each whorl; the last whorl is striated and bicarinated, terminating in a simple or undivided wing; the caudal extremity is straight, smooth, and of moderate length. *A. hamus* is the species which approximates most nearly to it; but in that shell the longitudinal costæ are less numerous, not oblique, and are visible throughout the length of the whorl; whereas in the *A. Phillipsii* they occupy the lower half only, and form an angle at their upper termination. The upper and larger carina upon the last whorl is more smooth and less prominent than in the *A. hamus*, and the entire form of the shell more lengthened or slender.

Locality. Scarborough, in dark chocolate-coloured argillaceous shale. Great Oolite, (*Phillips.*)

ALARIA PAGODA. Plate III, fig. 6.

Testá turritá; anfractibus numerosis, in medio carinato-crenatis, ultimo bicarinato; carinis tuberculatis; anfractibus transversè striatis; striis duabus prominentibus suturam *approximantibus. Alá magná, expansá, in digitos duobus productá, digitis parvis, caudá brevissimá.*

Shell turrited; whorls numerous, each with an acute mesial carina, the last whorl with two carinæ; the edges of the carina undulate and are nodulated; the whorls are transversely striated above the carina; beneath are two prominent striæ, bordering the suture; wing large and expanded, extended into digitations; the digitations are small, the caudal termination very short.

This elegant shell possesses a certain family resemblance, which places it near to several of our Great Oolite examples of the genus. The acute carina reminds us of *A. trifida*, the nodules of *A. hamus*, and the general figure of the wing and caudal extremity of *A. paradoxa;* the whorls are comparatively numerous and narrow, the mesial carina very prominent, and the junctions of the whorls strongly defined.

Locality. The white stone of Eastcombs has furnished our only example.

ALARIA ATRACTOIDES, *Desl.* sp. Plate III, figs. 7, 7*a*.

PTEROCERA ATRACTOIDES, *Deslongchamps.* Mém. Soc. Linn. de Normandie, vol. vii, p. 166, pl. 9, figs. 7, 8, 9.
— — *Desh.* Lam. An. sans Vert., 2d Edit., 1843, tom. 9, p. 681.
— — *D'Orb.* Prod. Paléont., p. 302.

A. " *Testá fusiformi, transversim striatá; striis alternis altioribus; anfractibus bicarinatis (carina superiore majore) longitudinaliter plicato-nodosis, plicis remotiusculis, nodis quadratis, acutis, ultimo anfractu subgibbo; caudá longá, incurvá.*" (Deslongchamps.) *Alá expansá in digitis trigonis quatervis vel quinque (digito superiori majori).*

Shell fusiform, transversely striated; striæ alternately elevated; whorls twice carinated (the upper carina being the largest), longitudinally nodulated and plicated; the plications remote, the nodules square and acute. The last whorl is large, the canal long and curved, the wing expanded, having four and perhaps five triangular digitations, of which the upper one is the largest.

We have three specimens of this rare shell, in one of which the wing is well developed, with the exception of the extremity of the lower digitation, which may be imperfect.

Locality. The planking beds of Minchinhampton Common. Great Oolite (*caillasse*), Ranville, Normandy. (*Desl.*)

ALARIA HEXAGONA. Plate III, fig. 8.

A. Testá turritá; anfractibus paucis (4), *angulatis et nodulosis; nodulis* 6 *hexagonis; ultimo anfractu unicarinato, nodulosa, varicem ori oppositum gerente. Alá parvá, caudá sublonga; aperturá contractá, ovatá; labro sinistro tenui.*

Shell turrited; apex obtuse; whorls few (4), prominently angulated and nodulated;

nodules 6 in a volution, giving it a six-sided aspect. The last whorl has a single nodulated carina, which has a prominence placed opposite to the aperture. The wing seems to be but little produced, and is not divided into digitations. The canal is rather long and straight; the aperture ovate and contracted; the left lip thin.

This is a rare species, of which we have only seen about six specimens: all of these have been more or less imperfect, the wing being badly preserved, or wanting altogether.

Locality. The planking beds of Minchinhampton Common.

ALARIA PARADOXA, *Desl.* sp. Plate III, figs. 9, 10.

PTEROCERA PARADOXA, *Deslongchamps.* 1842. Mém. Soc. Linn. Normandie, vol. vii, p. 170, pl. 9, figs. 16—18, 20—22.
— — *Desh.* Lam. An. sans Vert., 2d Edit., 1843, tom. 9, p. 682.
— — *D'Orb.* 1850. Prod. Paléont., p. 302.

A. Testâ parvâ ovatâ; spirâ breviusculâ obtusâ; anfractibus 7 *angulato-nodosis, nodis remotiusculis; ultimo anfractu pluricostato, costis transversis subæquidistantibus, et inæqualibus; caudâ brevi, rectâ; alâ angustâ, varicem simulante, pluri-dentatâ, dentibus inæqualibus subtùs canaliculatis, aperturâ angustatâ, varicem formante.*

Shell small, ovate; spire moderately elevated, obtuse; whorls angulated and nodulated, the nodules being distant, or about 7 in a volution. The last whorl has plain transverse ribs, nearly equidistant, and slightly unequal in size. The canal is short and straight; the wing is thickened into a kind of varix at the aperture, which is contracted.

The spire bears a larger proportion to the last whorl than appears in M. Deslongchamps' figures, which may be accounted for by his having restored the former portion from another specimen; exactness in such a case is not to be expected.

This species is comparatively rare. We have scarcely seen one which is perfect.

Locality. Great Oolite of Minchinhampton. Bath Oolite (*pierre blanche*), Langrune, Colleville, Normandy. (*Deslongchamps.*)

ALARIA PARADOXA, var. Plate III, fig. 9*a*.

Shell ovate; spire moderately elevated; whorls (6) convex, rendered angular by prominent tubercles, of which there are seven or eight in a volution; the last whorl is large, has numerous transverse ribs, of which two are more prominent; the ribs terminate in small digitations; there is also a large bifid spine placed opposite to the wing.

As compared with *A. paradoxa,* the spire is more elevated, and bears a larger proportion to the body whorl; the encircling ribs upon the last whorl are much more elevated and unequal, the two larger ones giving a kind of bicarinated aspect to it, and terminating in digitations, which are much larger than in the former shell. The large bifid spine upon the opposite side of the whorl is another distinctive character. The caudal extremity is short and straight. Length, 10 lines; breadth, including digitations, 9 lines.

Locality. This species is found in all the shelly beds, but is far from common.

ALARIA TRIFIDA, *Phil.* sp. Plate III, figs. 11, 11*a*, 11*b*, 11*c*.

ROSTELLARIA TRIFIDA, *Phillips.* 1835. Geol. of Yorksh., i, t. 5, fig. 4.
— BISPINOSA, *Phillips.* Geol. of Yorksh., i, t. 4, fig. 32.
— BICARINATA, *Goldfuss.* Petref, t. 170, fig. 1.
— TRIFIDA, *Deslongchamps.* Mém. Soc. Linn. Normandie, vol. vii, pl. 9, figs. 28, 29, 30, 31.
— — *Desh.* Lam. An. sans Vert., 2d Edit., t. 9, p. 665.

A. "*Testâ fusiformi, turritâ, transversè striatâ, anfractibus medio carinato-acutis; ultimo bicarinato, gibbo; alâ didactylâ, digitis in ætate adultâ longissimis, recurvatis; in juniore modo unico, modo duobus inæqualibus digitis, seu inferiore, seu superiore longiore; caudâ longissimâ, recurvatâ; aperturâ angustatâ.*" (Deslongchamps.)

Shell fusiform turreted, transversely striated; whorls acutely carinated about the middle part; the last whorl has two carinæ, the upper of which is most prominent, and has a prominence or spine opposite to the aperture. The wing is digitated; when full grown the digitations are very long and recurved, the larger being sometimes the upper, and at other times the lower digitation. In the young state it has only one carina and digitation. The canal is very long and recurved, the aperture small.

Having had the advantage of examining a large number of specimens, comprising every variety both in form and stage of growth, we feel no hesitation in uniting the two species here indicated. The whorls have every degree of angularity, specimens of *A. bispinosa* having the lower half of each volution simply cylindrical, the carina not projecting beyond it, and the first three or four whorls are smooth and simply convex, scarcely showing any trace of angularity. The extreme of the other variety has the carina not only angulated acutely, but spread out horizontally into a prominent tabular border.

The encircling striæ are equally variable. In some instances the striæ are regular and equal, but more frequently they are alternately large and small; at other times, however, they are altogether irregular and unequal.

Locality. This species occurs throughout the whole of the Great Oolite near Minchinhampton; even the upper beds, when shelly, not unfrequently contain it. Undoubtedly it is the most common example of the genus. In the Calcareous grit; Oxford Clay; Kelloway Rock, near Scarborough, Yorkshire (*Phillips*).

M. E. Deslongchamps describes this species as occurring throughout the jurassic series of Normandy, viz. the *Lias*, Fontaine-Etoupefour; *Inferior Oolite*, Bayeux; *Great Oolite*, Ranville; *Oxford Clay*, Vaches-Noires; *Kimmeridge Clay*, Villerville.

ALARIA PARVULA. Plate III, fig. 12*a*, 12*b*.

A. Testâ parvâ, turritâ; anfractibus quinque convexis, angustatis, lævibus, ultimo planato, striato; striis transversis, crebris, acutis, subcrenulatis; caudâ brevissimâ; alâ—?

Shell small, turreted, volutions (5) convex, narrow, smooth, the last volution flattened, striated, striæ transverse, closely arranged, acute, and slightly crenulated; the canal nearly obsolete; wing unknown.

Locality. The planking of Minchinhampton Common has furnished only one well-preserved specimen with which we are acquainted,—it does not exceed 6 lines in length; the whorls are very narrow and convex, the striæ being visible only upon the body whorl.

ALARIA? CIRRUS, *Desl.* sp. Plate III, figs. 13, 13*a*.

ROSTELLARIA CIRRUS, *Deslongchamps.* 1842. Mém. Soc. Linn. Normandie, vol. vii, p. 178, pl. 9, f. 26.
— — *Desh.* Lam. An. sans Vert., 2d Edit., tom. 9, p. 668.
PTEROCERA CIRRUS, *D'Orb.* 1850. Prod. Paléont., p. 302.

A. Testâ turritâ, transversim striatâ, apice acuminato; anfractibus medio carinatis, ultimo inflato, bicarinato; carinâ superiori eminentiori, gibbum transversè oblongum ori oppositum gerenti: alâ brevissimâ, in ætate juniori monodactylâ, deinde (ætate progredienti) didactylâ, digitis longis, divaricatis, tenuibus, trigonis. Caudâ longissimâ, rectâ, apice incurvo. (Deslongchamps.)

Shell turreted, apex pointed, transversely striated, whorls carinated in the middle, the last whorl inflated, having two carinæ; the first carina being the most prominent. A transverse prominence is placed opposite to the aperture; the canal is long and straight, except the extremity, which is curved.

A single specimen, in which the last whorl is imperfect, is all we have to refer to; the form, however, is unequivocal; the spire is unusually short and ventricose, as compared with other examples of the genus, and in the stage of growth which our specimen exhibits, had not acquired the large digitations and caudal extremity proper to a later period.

Locality. Minchinhampton Common; it must be referred to some of the shelly beds beneath the planking; rare. *Great Oolite,* Ranville, Normandy. (*Desl.*)

Family—MURICIDÆ.

FUSUS, *Lam.* 1801.

Shell fusiform or subfusiform, ventricose in the middle, with an elevated spire, volutions convex, generally costated or striated; aperture ovate, terminating anteriorly in a more or less elongated canal, outer lip entire, sharp; columella smooth.

Fusus multicostatus. Plate V, fig. 6, 6*a*.

F. Testâ parvâ, turritâ, turbinatâ, anfractibus convexis (5—6), *suturis profundè separatis; costis longitudinalibus numerosis, obliquis, striis transversis, crebris; aperturâ parvâ, caudâ breviusculâ.*

Shell small, turreted, turbinated; whorls very convex, 5—6 in number; the sutures being deeply impressed, the costæ are longitudinal, rounded, and directed obliquely from left to right; there are also numerous closely-arranged transverse striæ; the aperture is small, the canal short.

Locality. The planking bed of Minchinhampton Common has afforded this pretty little species: it is moderately rare.

Fusus coronatus. Plate V, fig. 5.

F. Testâ parvâ, turritâ, anfractibus convexis, angustatis et nodulosis (*nodulis* 9), *parte superiori transversè trilineatis; anfractu ultimo ventricoso; basi lævi, caudâ subrectâ.*

Shell small, turreted, whorls convex, narrow, and nodulated; nodules about 9 in a volution, with three encircling lines beneath the middle of each volution; the last whorl is ventricose, the caudal extremity nearly straight.

The general aspect of this little species has some resemblance to a *Rostellaria;* there does not appear, however, to be any expanded wing or other characteristic features of that genus.

Locality. It is very rare. We have obtained only three specimens, which occurred in the planking of Minchinhampton Common.

Fusus? sub nodulosus, *D'Orb.* Plate V, fig. 9, 9*a*.

Fusus subnodulosus, *D'Orb.* 1850. Prod. Paléont., p. 303.
— nodulosus, *Deslongchamps.* Mém. Soc. Linn. Normandie, vol. vii, pl. 10, figs. 36, 37. (Not *Sow.*, 1837.) (Not *Lamarck.*)

F. Testâ minutâ, ovato-turritâ, acutâ; anfractibus rotundato-inflatis, transversè striatis, nodulis (6) *subobliquis, longitudinalibus; columellâ marginatâ, aperturâ ovatâ, caudâ breviusculâ.*

Shell minute, ovately turreted, acute; whorls rounded, tumid, transversely striated; nodules 6 in a volution, longitudinal, and rather oblique; columella marginated, aperture ovate, caudal extremity short; length, 3 lines.

The transverse striæ are not mentioned by M. Deslongchamps; but in the specimen which we have figured they are very distinct.

Locality. It would appear to be very rare, and has been found only in the planking of Minchinhamptón Common; but with this and other minute shells it is not easy to form an accurate notion of their actual numbers. In the Bath Oolite of Langrune, Normandy. (*Desl.*)

BRACHYTREMA. *Nov. Gen.*

FUSUS. Species in part. *Auct.*

The Great Oolite shells, which we have placed under this generic designation, present characters so much at variance with the received ideas of Fusus, that we have been induced to erect them into a new genus, under the name *Brachytrema;* the definition of this form, whether it be regarded as subdivision of *Fusus*, or as a distinct genus, is as follows:—

B. Testá turritá, turbinatá; anfractibus convexis et costatis, nodulosis, aut cancellatis; labro dextro tenui; columellá rotundatá, lævi, ad basin contortá; canali brevi, obliquo.

Shell small, turreted, turbinated; whorls either costated, nodulated, or cancellated; the last whorl large and ventricose; right lip thin and smooth; columella smooth, rounded, twisted near to the base, and reflecting outwards, forming a short oblique canal; aperture moderately large, subovate, its length being usually less than that of the spire.

The general figure of this genus is turbinated, and nearer to *Buccinum* than *Fusus;* it has, however, the base and channel of *Cerithium;* the short oblique canal and twisted columella separate it from *Fusus*, the genus to which the known species have most frequently been referred. The following forms may possibly be assigned to this genus:—*Murex haccanensis* of Phillips, the *Fusus carinatus* of Roemer, the *Triton buccinoideum*, the *Purpura filosa*, the *Murex versicostatus*, and the *Fusus corallensis* of Buvignier, and, probably, the *Fusus nassoides* and the *Fusus nodulosus* of Deslongchamps. All the species are small, the largest scarcely equalling 10 lines in length.

The *Fusus Thorenti* d'Archiac would appear at first sight to belong to this genus; but having examined the original specimens in the collection of Viscomte d'Archiac, we are inclined to believe that the figure in the 'Memoirs of the Geological Society of France' (vol. v, plate 30, fig. 8), is taken from an imperfect shell, which is closely allied to, if not identical with, the *Turbo pyramidalis* of the same author.

BRACHYTREMA BUVIGNIERI. Plate V, fig. 7.

B. Testá conicá, turbinatá, apice obtuso; anfractibus 5 *planatis, et costulatis; costis* (14) *longitudinalibus, elatis, lineas transversas numerosas, elatas, distantes gerentibus.*

Shell conical, turbinated, apex obtuse, whorls 5, flattened and costated; costæ longitudinal, elevated, about 14 in a volution, and impressed by transverse lines: the lines are numerous, distant, and elevated—a single one more elevated, being placed at the base of each whorl. The longitudinal ribs are occasionally unequal, one unusually large sometimes appearing, but not extending beyond the whorl, forming a varix after the manner of Triton; the columella is twisted, turned outwards at the base, and forms, with the outer lip, a short oblique channel, which is not perceptible upon the back of the shell; the outer lip is thin and dentated externally by the elevated transverse lines.

Locality. This species is moderately rare; it occurs in the coarse bed of planking at Minchinhampton Common, and is seldom well preserved.

BRACHYTREMA TURBINIFORMIS. Plate IX, fig. 35, 35*a*.

B. Testá turbinatá, ventricosá, spirá elevatá; anfractibus 4 *angustatis, convexis, nodulato-carinatis; ultimo anfractu ventricoso, costulis longitudinalibus; striis transversis numerosis, impressis; aperturá subrotundá, canali subnullo, columellá rectá.*

Shell turbinated, ventricose; spire elevated; whorls 4, narrow, convex, their sutures deeply impressed, having a nodulated carina; the last whorl is large and ventricose, having small longitudinal ribs crossed by numerous transverse striæ; the aperture is nearly round, the canal reduced to a mere notch; the columella straight.

This species is chiefly distinguished from its congeners by a greater dilatation of the last whorl, which is much expanded transversely. Unfortunately the beds of planking, which contain this and various other small univalves with ornamented surfaces, is of so coarse a structure, and adheres to the shells with such tenacity, that it is not often that their features can be distinguished. Length 6 lines.

Locality. Minchinhampton Common.

Family—BUCCINIDÆ.

PURPUROIDEA, *Lycett.* 1848.

MUREX, sp., *Sow.* 1827.
PURPURA, sp., *Buvignier.* 1843.
PURPURINA, sp., *D'Orb.* 1850.

P. Testá turbinatá, spirá elevatá, aperturá non longiori, apice subacuto; anfractibus convexis, in medio tuberculatis, anfractu ultimo ventricoso; basi truncatá, aperturá subquadratá, superne acutá, inferne truncatá, latá; canali lato, recurvato; columellá arcuatá, rotundatá, lævi, basi acuminatá, incurvatá; labio effuso, in medio subdepresso, labro tenui et sinuato, umbilico obtecto.

Shell turbinated; spire elevated, not longer than the aperture, with a somewhat acute apex; whorls convex, nodulated in their middle part, the last whorl ventricose, the base truncated, the aperture subquadrate, acute above, widely notched at the base, but not deeply nor recurved; columella curved, and turning inwards at its base, which is pointed; it is rounded and smooth; the inner lip is effuse, rather depressed in the middle, covering an umbilicus; the outer lip is thin and somewhat sinuated.

This is one of the most remarkable of the Great Oolite genera of Univalves, and has not as yet been found in any other than the oolitic rocks. It constitutes an addition to the *Purpurifera* of Lamarck, or the *Entomostomata* of De Blainville. The following characters in their combination will be found sufficiently to distinguish it from all other known genera: the truncated base, the wide and shallow notch, the columella smooth, rounded, and curving inwards, the concealed umbilicus, and the thin sinuated outer lip. The young shells are delicately striated or grooved, the basal notch is scarcely formed, and they are perfectly free from adherent shells. On the other hand, the full-grown shells are always more rugose; with advance of age their sulcations or other markings become irregular, or are nearly obliterated, the basal notch becomes more important, and not unfrequently the whole external surface becomes covered with adherent shells. It would even seem that those encrusting shells were carried about by the animal during life. They are never found upon the young shells, or within the aperture, upon the left lip, about the basal notch, or, in fact, upon any part which was in contact with the soft parts of the animal. As the *Purpuroidea* are found lying in every possible position, the absence of adherent shells upon the parts in question may be held conclusive as to their period of attachment.

It will be seen, then, that the generic characters above enumerated acquire importance only upon their being viewed in combination. Owing, perhaps, to a want of attention to this circumstance, it may be that an undue value has been assigned to one or two characters, or to the inspection of ill-preserved specimens, or the want of a sufficient number to exhibit their several phases of form and markings;—to one or all of these causes of error we may ascribe the fact, that one of our species has already been thrice figured and described under two generic and three specific designations.

The beds of planking upon Minchinhampton Common are the productive site of this genus. The shells are clustered together over a small area. Originally the space was about 100 yards in length and half that extent in breadth; but from the rapid quarrying of the stone, which there occurs in very large blocks, by far the greater portion is now removed, and the genus has already become comparatively scarce. Two other localities, near and upon the same geological position, have furnished it, but very rarely, and in a bad state of preservation. In the upper division of the Great Oolite near Minchinhampton (from the white limestone upwards), the genus is likewise found occasionally over small areas, and in considerable numbers; but, owing to the compactness of the investing limestone, the shells can never be extricated except as casts. In this condition, with some small portion of the shell preserved, they resemble the specimen figured in the 'Mineral Conchology,' t. 578, fig. 4; but when entirely denuded of the crystalline shell, they have the aspect of *Natica*, and without great care might be taken for that genus, the surface is smooth, and retains only the faintest traces of tubercles; the axial umbilicus is very conspicuous; and all trace of the wide basal notch being lost, the aperture resembles an entire-mouthed shell. The hard limestone being much used for rough walls, it is upon these, when partial disintegration has taken place, that the casts of *Purpuroidea* are to be found. The genus has never been discovered lower than the *planking*.

PURPUROIDEA MOREAUSIA. Plate IV, figs. 1, 1*a*, 2, 3, 3*a*, 4.

PURPURA MOREAUSIA, *Buvignier*. Mém. Soc. Philomath. Verdun, 1843, pl. 6, fig. 19, p. 26.
PURPURINA — *D'Orb*. Prod. Paléont., p. 357, 1850.

P. Testâ turritâ, globosâ; spirâ brevi, anfractibus 3—4, *nodulosis vel spiniferis; spinis magnis, obtusis, in serie unicâ* 7, 8, *aut* 9 *in ambitu; anfractu ultimo striato, striis regularibus transversè subundulatis* (*obsoletis in ætate seniori*)*; aperturâ amplâ, subquadratâ; canali dilatato, leviter excavato.*

Shell globose, spire prominent, whorls 3—4, angulated; angles tuberculated; tubercles large, elevated, 8 or in others 7, upon a volution; the last whorl ventricose; the tubercles increasing in size until they become large blunt spires; beneath the tubercles the surface has numerous undulating closely-arranged encircling costæ; the aperture is large and widely truncated at its base; the inner lip is somewhat depressed in its middle part.

This is by much the most abundant, and at the same time typical species of the genus. There may be considered to be two varieties, one having 8, the other only 7, spines in a volution; the latter variety has the spire more depressed, the aperture occupying three fourths of the entire length of the shell. The elevated longitudinal swellings, produced by the successive extensions of the outer lip in growth, sometimes interfere with the continuity of the encircling ribs,—cause them to undulate, and occasionally obscure them altogether hence, in the younger specimens, the ribs are more regular and distinctly marked. Very rarely, indeed, individuals have been found which simulate *P. nodulata*, the lines of growth being enlarged to imperfect ribs, which suddenly disappear, or are depressed at the place where, in the species referred to, the second circle of nodules is situated; the spire also becomes more elevated, which adds to the resemblance. In the figure given by Buvignier, the inner lip is more flattened, or *Purpura* like, than might have been expected; but the figure altogether is executed in a very indifferent manner.

Locality. The vicinity of Minchinhampton is the only locality in which this remarkable shell is known to have been procured in England. Buvignier mentions that M. Moreau, of St. Mihiel, has found it in the Coral rag of that place, and likewise in the ferruginous Oolite of Launoy.

PURPUROIDEA GLABRA. Plate IV, figs. 5, 5*a*, 6, 6*a*.

P. Testâ turbinatâ, ovatâ; *spirâ exsertâ; anfractibus* 5—6 *angulatis, angulis tuberculos* 10 *gerentibus; anfractu ultimo ventricoso, lævi, basi truncatâ; aperturâ magnâ.*

Shell turbinated, ovate; spire elevated; whorls 5—6 angulated; angles tuberculated; tubercles 10 in a volution; the last whorl ventricose, smooth, the base truncated; the aperture large.

In the young state the spire is simply convex, without tubercles, which are only faintly visible upon the last whorl. In every stage of growth the tubercles are less conspicuous than in either of the other two species, and the surface of the last whorl is entirely destitute of ribs and of a second circle of tubercles; the spire is smaller than in *P. nodulata*, but more elevated than in *P. Moreausia*. The length of the aperture is three fifths of that of the entire shell.

Locality. It accompanies the other congeneric forms in the Minchinhampton Great Oolite, but is very much the most rare of them. The proportion of each species is probably as follows: *P. Moreausia*, 50; *P. nodulata*, 5; *P. glabra*, 1.

PURPUROIDEA NODULATA. Plate V, figs. 1, 1*a*, 2, 3, 4.

MUREX NODULATUS, *Young* and *Bird*. Geol. of Yorkshire Coast, p. 245, t. 11, fig. 3.
— TUBEROSUS, *Sow.* Min. Con., t. 578, fig. 4; but not t. 229, fig. 1, which is a Tertiary shell.
PURPURA LAPIERREA, *Buvignier*. Mém. Soc. Philomath. Verdun, 1843, p. 27, pl. 6, fig. 21.
PURPUROIDEA NODULATA, *Lycett*. Annals of Nat. Hist., 1848, p. 250.
MUREX TUBEROSUS, *Brown*. Illust. Foss. Conch., p. 59, pl. 34, fig. 19.

P. Testâ turbinatâ, ovatâ; spirâ exsertâ; anfractibus 5—6 *angulatis; angulis tuberculos* (9—11) *plerumque elatiores gerentibus; anfractu ultimo subventricoso, tuberculis binis cincto, prope basin transversè carinato; tuberculis inferioribus minoribus, approximatis et in costulis longitudinalibus obliquis productis: aperturâ magnâ subquadratâ, labro dextro sinuato.*

Shell turbinated, ovate; spire elevated; whorls 5—6 angulated; the angles tuberculated; the tubercles usually elevated, 9, 10, or 11 in a volution; the last whorl ventricose, encircled with two rows of tubercles; those on the second row are much the smaller, and are more closely arranged, and prolonged into longitudinal oblique ribs, which are sometimes nearly obsolete; below the ribs is a transverse keel, placed near to the base of the shell. The aperture is of moderate size, the outer lip being much sinuated.

The first two or three whorls are convex, and destitute of tubercles; the tubercles vary much in size in different specimens—when very much elevated they are compressed laterally. In the young state, the apex of the spire is more acuminated, the surface of the whorls has fine encircling striæ, the second circle of tubercles is not formed, or is merely rudimentary, and the longitudinal ribs beneath and basal carina are both absent; the last whorl has therefore a smooth aspect, which is in striking contrast with specimens of advanced age. The length of the aperture in the adult shell somewhat exceeds that of the spire; but the latter portion varies much in altitude, and occasionally exceeds the aperture in length. Upon the whole, the aspect of this species varies so considerably, independently of the changes produced by the stages of growth, that a considerable number are requisite for its full elucidation. It accompanies *P. Moreausia*, but is much more rare, probably in the proportion of about 1 to 10.

The figures given by Young, Sowerby, and Buvignier, present but a remote resemblance to each other and to our figures, but there cannot be much doubt of their identity. Young's figure represents an individual with a spire rather depressed; that in the 'Mineral Conchology' is from a mutilated specimen, little better than a cast. Buvignier's figure is likewise imperfect, besides which, the artist appears to have represented the inner lip of a true *Purpura*.

Locality. Minchinhampton Common.

This species has been found in Yorkshire only in the Coralline Oolite, where casts are stated to be not unfrequent in the hard limestone. M. Buvignier's specimen is from the ferruginous oolite of Vieil-St.-Remy.

Family—CERITHIADÆ.

CERITHIUM, *Adanson*, 1757. *Brug.*, *Lam.*

Shell elongated, tuberculated or costated, seldom smooth; spire pyramidal or cylindrical, composed of numerous volutions; aperture subquadrate, terminated anteriorly by a short canal, which is most frequently reflected outwards and backwards.

CERITHIUM QUADRICINCTUM, *Goldf.* Plate IX, fig. 8.

CERITHIUM QUADRICINCTUM, *Goldfuss.* Petref., p. 32, t. 173, fig. 11.
— — *Bronn.* Index Palæont., p. 272.

C. Testâ conicâ, anfractibus (10—12) *quadrigonis, cingulatis, cingulis superficialibus quarternis granulatis; granulis longitudinalibus seriatis.*

Shell conical, spire obtuse, whorls (10—12) rather convex; encircled with four costæ; the costæ are granulated, so as to form a longitudinal series. The whorls are narrow, the height scarcely exceeding one third of the transverse diameter; the largest specimens do not exceed half an inch in length, and half of that length may be considered as the average dimensions.

Locality. It is by far the most abundant of the Great Oolite Cerithia, and may usually be seen sprinkled over the blocks of planking at Minchinhampton Common; but occurs indifferently in all the shelly beds.

CERITHIUM LIMÆFORME, *Röm.* Plate VII, fig. 2.

CERITHIUM LIMÆFORME, *Roemer.* 1836. Nordd. Oolith., p. 142, t. 11, f. 19.
— — *Goldfuss.* Petref., iii, p. 33, t. 173, f. 17.
— — *Bronn.* Index Palæont., p. 269.

C. Testá turritá, anfractibus (7—8) *depressis, subplanis, cingillato-granulatis trilineatis, granulis majusculis approximatis costellas longitudinales formantibus, aperturá ovatá, canali brevi truncato.*

Shell turreted, apex pointed, whorls (7—8) depressed, nearly flat, having transversely nodulated costæ, three in number upon each whorl; the nodules are nearly joined longitudinally, presenting the appearance of longitudinal ribs in the young shell; but in a more adult state the upper row becomes more distinctly separated from the other two, which latter have sometimes an additional row of smaller granules between them.

This shell, as compared with *C. quadricinctum,* would appear to be much more rare; but as it requires a close inspection to distinguish them, some uncertainty must exist.

Locality. It accompanies the above-mentioned species in all the shelly beds. Its length does not exceed 3 lines.

CERITHIUM SEXCOSTATUM. Plate VII, fig. 3, 3*a*.

C. Testá turritá, lævi, anfractibus convexiusculis, costatis; costis (6—7) *longitudinalibus, lævigatis, rotundatis, angustatis, rectis; aperturá ovatá; caudá obsoletá.*

Shell turreted, smooth; whorls rather convex, costated; costæ (7—6) longitudinal smooth, rounded, narrow, and straight; aperture ovate. The ribs do not form a continuous line upon the volutions, a complete circle occupying more than 6, but less than 7 costæ, whose upper extremities scarcely reach the sutures of the whorls; the whorls are rather high, their junctions are deeply impressed, the last whorl being equal in length to two fifths of the entire shell. Axis 7½ lines.

Locality. The white stone of Bussage has furnished our only example.

CERITHIUM PENTAGONUM, *Archiac.* Plate IX, fig. 22.

CERITHIUM PENTAGONUM, *Archiac.* Mém. Soc. Géol. Fr., tom. 5, p. 384, t. 31, f. 6.
— — *D'Orb.* Prod. Paléont., p. 303.
— — *Bronn.* Index Palæont., p. 271.

C. Testá subulatá, apice acuto, anfractibus (10—11) *planatis, pentagonalis, longitudinaliter costatis; costis* 5 *in ambitu, perpendiculariter continuis, elatis, subacutis; striis numerosis transversis impressis; canali minimá.*

Shell subulate, apex acute, whorls (10—11) flattened, pentagonal, longitudinally costated; costæ continuous, perpendicular, elevated, rather acute, 5 in a volution; striæ numerous, transverse; canal very small.

This elegant, symmetrical, and remarkable species has the junctions of the whorls strongly marked; it ranks among the choicest of our smaller shells. Axis 9 lines, transverse diameter 2 lines.

Locality. It has been found only in the planking of Minchinhampton Common and white stone of Bussage. We are not aware that more than four examples have been discovered.

CERITHIUM STRANGULATUM, *Archiac.* Plate IX, fig. 18.

CERITHIUM STRANGULATUM, *Archiac.* 1843. Mém. Géol. Soc. France, v, p. 382, t. 31, figs. 1, *a*, *b*.
— — *D'Orb.* Prod. Paléont., p. 303.
— — *Bronn.* Index Palæont., p. 274.

C. Testá minutá, subcylindricá, pupæformi, costatá; anfractibus subplanatis 7, *transversim sulcatis; sulcis* 4, *penultimo* 5; *costis* (6) *rectis, elatis et longitudinaliter continuis ab apice ad anfractum penultimum; apertura constrictá, parvá, obliquá subrotundá; canali nullo.*

Shell minute, subcylindrical, or pupæform, costated; whorls nearly flat (7), transversely sulcated, sulci 4, and 5 upon the penultimate whorl; costæ 6, straight, elevated, and longitudinally continuous from the apex to the penultimate whorl; aperture contracted, small, oblique and somewhat rounded; no canal.

This little shell has prominent lines dividing the transverse sulcations; the costal elevations, although strongly marked upon the first three or four whorls, are not distinguishable upon the latter two; these whorls have also a greater proportional length than the others, their breadth but little exceeding their height; the junctions of the whorls are not very strongly marked, the apex of the spire is obtuse, the aperture much contracted, rounded, and oblique or pupæform.

The obtuse spire, flattened whorls, and fewness of the costæ, will distinguish this from *C. bulimoides*, Deslongchamps, and *C. Roëmeri*, Goldfuss; to which in other respects it has some resemblance. We have considered it a variety of *C. strangulatum*, Archiac, although in that species the apex is pointed, the general breadth is greater, and the costæ are continued even to the base of the shell.

Locality. Ancliff, Wiltshire; Eparcy, France.

CERITHIUM TENNANTI. Plate IX, fig. 20.

C. Testâ turritâ, acutâ, conicâ, anfractibus numerosis, angustatis, tricinctis; carinis tribus, elatioribus, striis numerosis longitudinalibus impressis; basi planatâ, canali brevissimâ.

Shell turreted, acute, conical, whorls numerous, thrice cinctured; the bands elevated, and impressed with numerous longitudinal striæ; base flattened, canal obsolete.

The transverse keels are equal, narrow, and elevated, one being mesial, the others close to the anterior margin of the whorls; the figure is perfectly regular, and the whorls narrow; the aperture and canal are very short.

Locality. Ancliff.

Named after Prof. J. Tennant, from whose interesting collection of Oolite Fossils this species is figured.

CERITHIUM ROISSII, *Arch.* sp. Plate VII, fig. 14, 14*a*.

TURRITELLA ROISSII, *Archiac.* 1843. Mém. Soc. Géol. Fr., vol. v, p. 380, t. 30, f. 2.
— — *Bronn.* Index Palæont., p. 1336.
CHEMNITZIA ROISSYI, *D'Orb.* Prod. Paléont., p. 298.

C. Testâ turritâ subconicâ, lævi, apice acuto; anfractibus paucis, planatis; suturis vix tumidulis; caudâ brevi subrectâ.

Shell turreted, subconical, smooth; apex acute; whorls few, flattened; the sutures slightly tumid; canal short, and nearly straight.

A very short or conical species, the diameter of which through the last whorl is upwards of half the entire length of the shell; a longitudinal section displays a columella of great thickness, the internal cavity being small.

Locality. Rare in the Great Oolite of Minchinhampton Common. Eparcy, France.

NERINÆA, *Defrance.* 1825.

Shell turreted, either conical or cylindrical, consisting of numerous whorls; aperture subquadrate, having an anterior and posterior short canal; columella, with one or more folds; outer lip, with one or more folds, which are continued through the length of the shell; columella umbilicated in the conical, solid in the cylindrical species.

NERINÆA VOLTZII, *Desl.* Plate VII, figs. 11, 11*a*; *var?* figs. 7, 7*a*.

NERINÆA VOLTZII, *Deslongchamps.* 1842. Mém. Soc. Linn. Normandie, vol. vii, pl. 8, fig. 34.
— — *D'Orb.* Prod. Paléont., p. 298. (Not *N. Voltzii,* D'Arch.)

N. Testá turrito-conicá, spirá angulo 18°—22°, *anfractibus subplanis inornatis; columellá crassá, prius solidá denique perforatá, plicas duas parvas, remotas gerente; labro dextro intus uniplicato, aperturá rhomboidali.*

Shell elongated, conical, smooth; in its young state there is usually a slight depression round the lower part of each whorl, this is gradually lost in the larger whorls, which are quite flat; but specimens may be found in which all the whorls are slightly convex. The columella is solid in the young shell; but usually becomes perforated about an inch below the apex; there is great variety in this respect in different specimens, the perforation sometimes commencing within half an inch from the apex, while other shells, an inch and a half long, may be found quite solid. The spiral angle also varies from 20° to 22° in different specimens; in some instances the sides of the shell are straight, in others the lower part is more cylindrical than the upper; in some few instances the lower part of the shell enlarges more rapidly than the upper, in which case the perforation of the columella is unusually large. Thus the species varies in its external form, from a neat, regular shell to a very clumsy one. The aperture is rhomboidal, its height being half as much again as its width, ending below in a short canal. There are three internal folds, viz.: one on the outer lip, near to the base of the whorl, which is insignificant at the aperture, but long and strong in the inner whorls; another, thick and blunt on the columella, a little below the preceding; thirdly, one small and blunt on the top of the whorl. These folds are very constant in form, and serve to distinguish the species readily.

Sutural angle	90° to 95°
Basal angle	125° to 130°

Length, 1 inch to 2½ inches.

In the young state, or when the axis does not exceed 10 or 12 lines, the aspect is so dissimilar of this protean shell, that a particular description of that condition is necessary:—It is taper and pointed, the volutions are convex, very narrow, an individual of 9 lines having as many whorls. The sutures are very deeply depressed, the shell is altogether delicate and fragile, but perfectly regular. Specimens exceeding 10 lines increase disproportionally in the height of their whorls; they become more flattened, the sutures are less strongly defined, the shell acquires a considerable increase of thickness, and the whole is changed.

Locality. This specimen occurs in every stage of growth and throughout the entire thickness of the formation in Gloucestershire; its habits were gregareous—the shelly weatherstones more especially contain it in great numbers.

Nerinæa (Trochalia) Eudesii. Plate VII, fig. 6, 6*a*.

? Cerithium Defrancii, *Deslongchamps.* Mém. Soc. Linn. Normandie, vol. vii, pl. 8, fig. 36.

N. Testá turritá, conicá, anfractibus (10) *concavis, angustatis, lineis transversis cinctis* *cum aliis minoribus alternatis, suturis carinatis, carinis elatis et lævigatis, basi planulatâ, canali brevissimo; aperturâ subquadratâ.*

Shell turreted, conical, excavated; whorls (10) concave, narrow, with numerous transverse very fine lines, alternating with others still more faintly impressed; the sutures are carinated, the carinæ elevated and smooth, the base flattened, the canal short. Aperture subquadrate.

The general aspect of our species approaches near to the *Cerithium Defrancii* of M. Deslongchamps, whose figure however is less conical, and the concavity of the whorls is much less. These differences, however, are only such as may pertain to varieties of the same species. It is rare; and the few examples which have occurred to us are composed entirely of crystalline carbonate of lime, which does not allow of the internal characters being fully determined; as far as we can observe them, the outer lip is simple, and the columella plicated with one fold, and the upper portion of the volution has a very slight fold. This shell belongs to the subgenus *Trochalia*, Sharpe; but to the species having the columella solid and not hollow.

Locality. The upper portion of the shelly beds near to Minchinhampton and Chalford.

NERINÆA DUFRENOYI, *Arch.* sp. Plate VII, fig. 8, 8*a*—8*e*.

CERITHIUM DUFRENOYI, *Archiac.* 1843. Mém. Soc. Géol. Fr., vol. v, pl. 31, figs. 3, 4.
— — *D'Orb.* 1850. Prod. Paléont., p. 303.

N. Testâ parvâ, cylindrico-subulatâ; anfractibus latis, planatis, costulis cinctis, et nodulatis; cingulis 4 *aut* 5, *inæqualibus dense-nodulatis, cingula infra suturam valde elatâ, et lævigatâ, sine nodulis. Anfractibus lineis perpendicularibus, interstitialibus dense et tenuissime instructis. Aperturâ elongatâ, columellâ solidâ, plicis duabus? parvis; plicâ externâ unicâ, magnâ.*

Shell small, cylindrical, or subulate; the whorls wide, flattened, encircled with costæ, which are nodulated; the encircling bands are 4 or 5, unequal and closely, but sometimes imperfectly, nodulated; the band nearest to the upper suture the largest and most elevated, it is nearly smooth, and without nodules. The surface of the volutions has also very closely-arranged fine perpendicular lines visible upon the interstices of the cinctures. The aperture is elongated and narrow; the columella solid, with two small folds; the outer lip has a single, much larger fold.

The perpendicular length of the whorls is nearly equal to their transverse diameter; the sutures are strongly marked. The usual length of this species does not exceed an inch, the number of volutions in large specimens not exceeding ten. The coarseness of the Great Oolite rock is not favorable to the preservation of the more delicate features of this pretty and fragile species, so that in the greater number of instances the surface of the whorls is nearly smooth. It occurs in all the shelly beds of the formation in Minchinhampton district, and may be discovered in every quarry, sometimes in great numbers.

The smallness of the object, and the state of preservation, renders it difficult to obtain a good section of the interior; the folds upon the columella have been but imperfectly disclosed, but there is little doubt that they are as above described; the aperture is usually more narrow than is represented at fig. 8*a*.

Locality. Minchinhampton Common; Eparcy, France.

NERINÆA STRICKLANDI. Plate VII, fig. 9, 9*a*.

N. Testâ cylindrico-subulatâ, anfractibus latis, planatis, superne leviter convexis, suturis profundis impressis; cingulis scabris aut crenulatis, numerosis et approximatis, superne evanescentibus: aperturâ, plicisque ignotis.

Shell cylindrical or subulate; whorls wide, numerous, flattened, or very slightly convex on their upper portions, their sutures strongly marked; the whorls are encircled with numerous, closely-arranged, scabrous, or crenulated lines, which are nearly obsolete upon their upper portions: aperture and plicæ unknown.

The character of the surface much resembles *Cerithium tortile,* Deslongchamps; but the whorls in that shell are much more convex and narrow; in the present species the length of the whorls perpendicularly is about equal to their transverse diameter.

Locality. The Stonesfield slate on the borders of Minchinhampton Common has furnished our specimens; they have occurred rarely, and only in fragments; when perfect, the length must be considerable.

NERINÆA PUNCTATA, *Voltz.* Plate VII, fig. 10, 10*a*, *b*, *c*.

NERINÆA PUNCTATA, *Voltz.* and *Bronn.* Jahrb., 1836, p. 559, t. 6, fig. 23.
— — *Bronn.* Index Palæont., p. 803.

N. Testâ turrito-conicâ, anfractibus sub-gradatis, cingulatis, cingulis binis ternisve nodulosis; columellâ solidâ, biplicatâ, labro dextro uniplicato.

Shell elongated, conical, with a regular spiral angle of about 18°; whorls flat, projecting at the upper part beyond the whorl above, and thus giving a step-like outline to the shell; ornamented with two or three transverse finely-knotted rings: columella solid. Three internal folds, viz.: one strong sharp fold on the middle of the outer lip; one smaller fold on the columella, a little lower than the former, and a blunt thick fold on the top of the whorl near to the columella. Aperture rhomboidal, rather higher than wide.

This is a more regular and elegant shell than *N. Voltzii,* to which it is so nearly allied, that worn specimens of the two species may easily be confounded: in that case the *N. punctata* may be distinguished by its step-like outline, flatter base, and longer and sharper folds on the columella. With *N. elegans* (Thurm.) it may perhaps be identical, in which case that name must be adopted for it: until this is decided we must call our shell *N. punctata,* as it is clearly the species so designated by Voltz.

Sutural angle, about 92°
Basal angle, about 120°
Length, from 1 to 2 inches.

Locality. Found in the shelly beds near Minchinhampton, and more frequently in the quarries to the north of the vale of Chalford.

NERINÆA FUNICULUS, *Desl.* Plate VII, fig. 12, 12*a*, *b*.

NERINÆA FUNICULUS, *Deslongchamps*. 1842. Mém. Soc. Linn. Normandie, vol. vii, p. 186, t. 8, figs. 30—32.
— CYLINDRICA, *Deslongchamps*. L. c., t. 8, fig. 33.
CERITHIUM BLAINVILLII (?), *Deslongchamps*. L. c., t. 8, fig. 35.
NERINÆA FUNICULOSA, *D'Orb.* Prod. Paléont., p. 298.

N. Testâ turritâ, longissimâ; anfractibus superioribus concavis, transversè striatis, inferioribus subplanis, aliis ad suturas tumescentibus, aliis vix prominulis; columellâ solidâ, triplicatâ, labro dextro uniplicato. (Deslongchamps, l. c.)

Shell very long and taper, but differing in the spiral angle in different specimens from 8° to 12°; the upper whorls are concave, with a strong projection at the suture, variously ornamented with from 5 to 10 transverse ribs of unequal fineness, one or two of which (in very well-preserved specimens) are seen to be composed of small knobs; the lower whorls become gradually flatter and smoother, and finally lose all traces of ribbing: columella solid. Four internal folds, viz.: one strong, thick fold on the outer lip, rather below the middle of the whorl; two on the columella, of which the lower sharp and well-defined is situated below that on the outer lip, and the upper faint and sometimes hardly visible, is placed opposite to the upper edge of the outer fold; and one sharp and long fold on the top of the whorl, close to the columella.

Nerinæa cylindrica of Deslongchamps appears to be a tapering variety of the same shell, in which the upper fold on the columella is ill-developed, or perhaps imperfectly seen.

This species is also closely allied to *N. fibula*, *N. Goodhalli* (not Sowerby's species), and *N. clavus* of Deslongchamps, all of which are probably one species: it differs from them in the greater concavity of the whorls, the transverse ribbing, and the presence of the upper small fold on the columella. It has probably been confounded with *N. fasciata* of Römer—a species which sadly wants revision.

Sutural angle, about 105°.
Basal angle, about 120°.
Length, up to 5 inches, but rarely exceeding 3 inches.

Locality. It is tolerably abundant in the shelly beds near Minchinhampton; but owing to its great fragility, large specimens can rarely be procured entire.

CERITELLA. *Nov. Gen.*

C. Testâ turritâ, spirâ acutâ, subulatâ, anfractibus planis, marginibus sæpissimè sulcatis; anfractu ultimo amplo; aperturâ elongatâ, obliquâ (canali (?) brevissimâ) columellâ lævigatâ, rotundatâ ad basim subreflexâ.

Shell turreted, spire acute, subulate, volutions flattened, their margins usually sulcated; the last whorl large, aperture lengthened and oblique, canal very short; columella smooth, rounded, and slightly reflected at the base; outer lip thin.

This genus is constituted to receive several species of subulate univalves, usually smooth, but sometimes sculptured longitudinally, which seem to be equally removed from *Terebra* on the one hand, and *Cerithium* on the other; from the genus *Fusus* they are still more remote. The increased size of the last whorl, together with the elongated narrow aperture, detach it from the *Cerithiæ;* neither has it the decided twist of the columella, which we find in *Terebra;* the base never terminates in a notch, but in a narrow, very short, channel, which is turned slightly forwards and outwards; the whorls are generally flattened, the length of the spire exceeding that of the aperture.

The *Ceritellæ,* from their individual number and variety of species, constitute an important group in the Great Oolite univalves. The delicacy of the outer lip is such, that a specimen with that part perfect has scarcely ever been obtained, the remaining portion usually giving to the base the aspect of a short channel, slightly directed outwards. It is certain, however, that in several of these species the base of the aperture is very narrow, and slightly twisted, approaching nearly to the channelled form, a character which, together with that furnished by the spire, separates it sufficiently from the *Acteoninæ* properly so called, and to which some of the species have a slight resemblance. We have, therefore, provisionally arranged these shells in this part of the series, until the characters of the aperture are more fully developed.

CERITELLA ACUTA. Plate V, figs. 17, 17*a*, 18, 18*a*.

C. Testâ turritâ, lævigatâ; spirâ elatâ, acutâ; anfractibus (6) *convexiusculis; aperturâ obliquâ angustatâ, caudâ recurvâ brevi.*

Shell turreted, smooth; spire elevated, acute; whorls (6) rather convex, aperture oblique, narrow; canal recurved and short.

The figure of this species varies considerably. The young shells are usually the most subulate. The length of the last volution is generally half that of the entire shell. Axis 10 lines, transverse diameter 4 lines.

Locality. It is numerous in all the shelly beds in the vicinity of Minchinhampton.

CERITELLA UNILINEATA, *Sow.*, sp. Plate V, fig. 13.

BUCCINUM UNILINEATUM, *Sow.* 1825. Min. Con., t. 486, figs. 5, 6.
— — *Morris.* 1843. Cat. Brit. Foss., p. 139.
PURPURINA UNILINEATA, *D'Orb.* 1850. Prod. Paléont., p. 302.

C. Testá parvá, ovato-elongatá, gibbosá; spirá acutá; anfractibus (7—8) *angustatis, superne planis et subangulatis.*

Shell small, ovately elongated, gibbose,; spire acute; whorls (7—8) narrow, flattened in their upper portions or subangulated.

This little gibbose shell has a spire about equal in length to the last whorl; the whorls are bevilled near to their upper junctions, or slightly depressed, which gives the appearance of *a line or furrow* encircling them. Axis 4½ lines, transverse diameter 2 lines; but the Ancliff specimens are usually smaller.

Locality. The white stone of Bussage has furnished only one specimen near Minchinhampton; but it is much more abundant at Ancliff.

CERITELLA PLANATA. Plate V, figs. 14, 14*a*.

C. Testá turritá, acutá; anfractibus angustatis, numerosis, planis ad basim unilineatis, aperturá et caudá ut in C. acutá.

Shell turreted, acute; whorls narrow, numerous, flattened; a single encircling line is placed at the lower part of each whorl, a little above the suture; aperture and canal as in *C. acuta.* Axis 4½ lines, transverse diameter 2½ lines.

Locality. Rare: the specimen figured is from the white stone of Eastcombs, in the parish of Bisley.

CERITELLA SOWERBII. Plate V, fig. 16.

C. Testá turritá, subfusiformi, acutá; anfractibus (7—8) *convexiusculis, infra suturam unilineatis; aperturá obliquá, elongatá; caudá brevi.*

Shell turreted, subfusiform, acute; whorls (7—8) slightly convex, with a transverse line beneath the suture; aperture oblique, lengthened; canal short.

This species varies considerably in the elevation of the spire. Axis 8 lines, transverse diameter 3 lines.

Locality. It occurs in the upper portion of the shelly beds, both north and south of the vale of Brimscomb. It is rare.

Ceritella mitralis. Plate V, fig. 15.

C. Testá conicá, apicè acuminatá, anfractibus (7) *angustatis, planis, marginibus subtumescentibus; aperturá parvá, obliquá; canali brevi.*

Shell conical, apex acute, whorls (7) narrow, flattened, their upper margins slightly turned; aperture small, oblique; canal short.

This species is unusually short and conical. Axis 5 lines, transverse diameter 3 lines.

Locality. The planking of Minchinhampton Common, where it is rare.

Ceritella conica. Plate V, figs. 10, 10*a*, 10*b*, 10*c*.

C. Testá turritá, acutá; anfractibus angustatis planis (8)*; costis longitudinalibus, a dextro ad sinistram obliquis; aperturá angustatá, canali obliquo.*

Shell turreted, acute; whorls narrow, flattened (8), with longitudinal oblique ribs, passing obliquely from right to left; aperture narrow, canal oblique.

The upper margin of each whorl has a slight encircling rib, which is united to the oblique costæ. The character of the markings in this species resembles *C. gibbosa;* but in that species, although the whorls are equally numerous, the spire is very small, and the canal is almost obsolete. The length of the last whorl is two fifths of the entire shell. Axis 6½ lines, transverse diameter 3 lines.

Locality. The planking of Minchinhampton Common and white stone of Bussage have furnished it but rarely.

Ceritella gibbosa. Plate IX, fig. 17.

C. Testá parvá turritá, spirá mediocriter elatá, apice acuto, anfractibus planatis, angustatis et angulatis, longitudinaliter costatis; costis numerosis, a dextro ad sinistram obliquis; anfractu ultimo, magno; aperturá obliquá, angustatá et elongatá.

Shell small, turreted; spire moderately elevated; apex acute; whorls flattened at the sides, narrow, and angulated at their upper portions; longitudinally costated; costæ numerous, directed obliquely from right to left; the last whorl large; aperture oblique, narrow, and elongated.

The angle of the whorls is slightly thickened and prominent; the costæ are distinct immediately beneath it, but are not discernible upon the lower portion of the whorls. The length of the aperture is equal to the remaining portion of the shell. The specimen figured is rather more gibbose than usually obtains, for the proportions vary, but in point of size there is no considerable difference. It is somewhat rare, and occurs in the soft shelly Oolite which underlies the planking. Axis 3 lines.

Locality. Minchinhampton Common.

CERITELLA LONGISCATA, *Buv.* sp. Plate IX, fig. 14.

PLEUROTOMA LONGISCATA, *Buvignier.* Mém. Soc. Philom., Verdun, 1843, pl. 6, fig. 8.

Testâ parvâ, turritâ, elongatâ; apice acuto; anfractibus (9—10) *subplanatis; costis longitudinalibus rectis numerosis, carinatis; carinâ unicâ marginali; aperturâ angustatâ; caudâ subrectâ.*

Shell smooth, turreted, elongated; apex acute; whorls (9—10) rather flattened, with longitudinal, straight, numerous ribs; and a single encircling smooth carina upon the upper margin of the whorls; aperture narrow, canal straight, short. Axis 3 lines.

Locality. This little species accompanies its allied forms in the soft shelly Oolite beneath the planking of Minchinhampton Common. It is very rare.

CERITELLA RISSOIDES, *Buv.* sp. Plate IX, fig. 7.

? PLEUROTOMA RISSOIDES, *Buvignier.* Mém. Soc. Philom., Verdun, 1843, pl. 6, fig. 9.

Testâ parvâ, turritâ; spirâ mediocri elatâ; apice acuto; anfractibus angustatis, posticis carinatis, carinâ rotundatâ; costis longitudinalibus, rectis, subincurvis; anfractu ultimo elongato; aperturâ angustatâ.

Shell turreted, spire moderately elevated, apex acute, whorls narrow, carinated at their posterior margin; carina rounded; costæ longitudinal, straight, or slightly curved; last whorl elongated; aperture narrow. Axis 2 lines.

Locality. This pretty minute species is usually found in the soft shelly Oolite beneath the planking of Minchinhampton Common. It is somewhat rare.

Family—NATICIDÆ.

NATICA, *Adanson.* 1757. *Lam.*

The species of *Natica* in the Great Oolite are divisible into two groups; one the *Natica* proper, the others we have arranged in the sub-group *Euspira*, a name suggested by Agassiz, for those species which have the spire more or less elevated, and the volutions distinct.

The *Naticæ*, though consisting of a considerable number of species, have, with one exception, furnished but a small number of individuals; and those belonging to the sub-group *Euspira* are all rare in the Great Oolite.

NATICA.

Shell subglobose, thick, smooth; spire pointed, more or less elevated, of few volutions; aperture large, oblique, ovate, entire; columella lip oblique, thickened, the umbilicus being nearly covered by a deposition of shelly matter upon the columella; outer lip simple, smooth.

NATICA INTERMEDIA. Plate VI, figs. 1, 1*a*.

N. Testá ovatá, spirá elatá, anfractibus (5) *convexis, angustis, superne planis; avertura ovato-elongatá, basi latá.*

Shell ovate, spire elevated, whorls (5) convex, narrow, flattened above; aperture ovately elongated, base wide.

The general contour of this shell approaches nearer to *Natica adducta*, Phillips, than any other Great Oolite species which we have examined. Its position is intermediate to that species and our *Natica Stricklandi*, which latter species is more elongated. In all these shells the upper portion of the whorls is horizontal; but in *N. adducta* it is even depressed as it approaches the suture, forming a narrow channel. *N. intermedia* is more ovate, or less globose, than *N. adducta.* In that species the transversal is equal to the longitudinal diameter; but in *N. intermedia* the dimensions are as follow: Length 2 inches, breadth 1 inch 7 lines.

Locality. The planking of Minchinhampton Common has supplied the few specimens we have met with.

NATICA GRANDIS, *Goldf.* Plate VI, fig. 12.

NATICA GRANDIS, *Goldfuss.* Petref., iii, p. 118, t. 199, fig. 8.
— — *Bronn.* 1848. Index Palæont., p. 783.

N. Testá globoso-depressá, spirá subexsertá, anfractibus convexiusculis, ultimo anfractu ventricoso; margine depresso; aperturá semilunari; umbilico tecto.

Shell globose, depressed; spire little elevated; whorls rather convex, their margins rather depressed, the last volution ventricose; the aperture large, semilunar; the umbilicus covered by a callosity of the lip.

We have only met with three examples of this species: two of these were obtained from the upper limestone beds, the other from the planking. The general form is more ventricose, and the last whorl more expanded, than either of our other species. The nearest approximation to it is the *Natica adducta*, Phillips, of which, possibly, our shell may only exhibit a more advanced stage of growth; but as the spire of that species is more produced, and as our shell perfectly agrees with the species figured by Goldfuss, we prefer, for the present, to retain his designation.

Locality. Minchinhampton.

NATICA STRICKLANDI. Plate XI, figs. 24, 24*a*.

N. Testá ovatá, spirá elatá, anfractibus convexiusculis, superne rotundatis, suturis subdepressis; aperturá oblique ovatá; basi angustatá.

Shell ovate, spire elevated, whorls rather convex, rounded above, their sutures slightly depressed; aperture oblique and ovate; base attenuated.

The length of the aperture scarcely exceeds half of the entire shell; the whorls, which are not numerous, are moderately wide, and somewhat flattened at their base; the apex is rather obtuse, and the general form is more cylindrical than is usual with shells of this genus, the largest transverse diameter being only equal to the length of the last and penultimate whorl. We have only obtained two specimens which occurred in the soft shelly Oolite underlying the planking, but, judging from casts, we should be inclined to believe the upper portion of the formation likewise contains it. It has been named as a trifling tribute of respect to H. E. Strickland, Esq., one of the few English geologists who, of late years, have contributed to our knowledge of the Oolitic system.

Locality. Minchinhampton.

NATICA FORMOSA. Plate VI, fig. 10.

N. Testá ovato-elongatá, spirá elatá, anfractibus (5) *convexis, ultimo anfractu oblique ventricoso; aperturá magná ovatá; basi rotundatá, labro sinistro excavato.*

Shell ovately-elongated, spire elevated, whorls (5) convex, the last whorl ventricose and oblique; the aperture large, ovate, the inner lip excavated, the base rounded.

We were at first disposed to refer this species to *Natica elegans*, Sowerby, but an examination of additional specimens has convinced us of its specific distinctness. As compared with that species, the spire is always much larger, and less angulated, and the aperture bears a much less proportion to the entire length, its longer diameter scarcely amounting to three fifths of the entire length of the shell. It occurs both in the planking and upper portion of the formation, but is somewhat rare. Length 26 lines, breadth 20 lines. The apex, when perfect, is more acute than our figure represents.

Locality. Minchinhampton.

NATICA TANCREDI. Plate VI, fig. 11.

N. Testá ovatá, spirá elatá, anfractibus (5) *angustatis in medio subangulatis; apice obtuso; anfractu ultimo subcylindrico, permagno; aperturá obliquá angustatá; basi subacuminatá.*

Shell ovate, spire elevated, whorls (5) narrow, somewhat angulated in their middle portions; the apex is obtuse, the last whorl is very large, and subcylindrical; the aperture oblique and narrow, the base somewhat pointed.

The narrowness of the base, narrow subangular whorls, obtuse apex, and subcylindrical figure of the last whorl, are the prominent features.

It has been named in compliment to Sir Thomas Tancred, Bart., the founder of the Cotswold Naturalists' Club.

Locality. The fine specimen figured was obtained in the hard white limestone of the upper portion of the Great Oolite formation near Minchinhampton, but it likewise occurs in the planking, being rare in both situations.

NATICA GLOBOSA, *Roem.* Plate VI, fig. 14.

NATICA GLOBOSA, *Roemer.* 1836. Nordd. Oolith., p. 156, pl. 10, f. 9.
— — *Bronn.* 1848. Index Palæont., p. 783.

N. Testâ globosâ, obliqua, ovato-orbiculari, hemisphericâ; spirâ latâ, prominulâ; aperturâ subreniformi; umbilico amplo.

Shell globose, oblique, ovately orbicular, hemispherical; spire large, but not much elevated; aperture kidney-shaped; umbilicus large.

All our specimens have been obtained from the upper or limestone portion of the Great Oolite; we have, consequently, been able to obtain only portions of the shell. The figure approaches so near to some of the casts of *Purpuroidea Moreausia,* that it is difficult, in the absence of nodules, to distinguish them. Our species is, however, more depressed, and the preserved portions of the shell are thicker than in the *Purpuroidea;* but we should always expect to find some traces of nodules in well-preserved casts of the latter genus. Length 14 lines, breadth 16 lines.

Locality. Minchinhampton.

NATICA NERITOIDEA. Plate VI, fig. 4.

N. Testâ oblique-ovatâ; spirâ parvâ, obtusâ, depressâ; anfractu ultimo elongato; aperturâ angustatâ, obliquâ; labio interno calloso.

Shell smooth, oblique, ovate; spire small, depressed, and obtuse, the last whorl elongated and narrow at the base; the aperture narrow and oblique, the inner lip thickened.

Two examples, with the shell partially preserved, are our authority. They are remarkable for the rounded and depressed form of the spire, which gives it a truncated aspect: it is likewise turned to one side simulating a *Nerita.* The form of the aperture and base is more narrow or contracted than any other Great Oolite species. Length 13 lines, width 9 lines.

Locality. A bed of sandy limestone, about 100 feet above the Fullers-earth.

NATICA VERNEUILI, *Archiac.* Plate VI, figs. 6, 6*a*, 7, 7*a*.

NATICA VERNEUILI, *Archiac.* 1843. Mém. Soc. Géol. France, t. 5, p. 378, pl. 30, fig. 3.
— — *Bronn.* 1848. Index Palæont., p. 788.
— — *D'Orb.* 1850. Prod. Paléont., p. 299.

N. Testá subhemisphericá, spirá elatá, anfractibus (5) *angustis et convexiusculis, apicè acuto; anfractu ultimo per magno, ventricoso; aperturá magná semilunari; basi latá et rotundatá.*

Shell subhemispherical, spire elevated, whorls (5) narrow and slightly convex, apex of the spire acute, last whorl very large and ventricose, aperture large, semilunar, base wide and rounded.

The planking has supplied the only good specimens of this rare species. It would also seem to occur in the calcareo-arenaceous beds of the upper portion of the formation, judging by the aspect of casts. Length 23 lines, breadth 22 lines.

Locality. Minchinhampton. Eparcy, France.

NATICA MICHELINI, *Archiac.* Plate VI, figs. 2, 2*a*, 3, 3*a*.

NATICA MICHELINI, *Archiac.* 1843. Mém. Géol. Soc. France, t. 5, p. 377, pl. 30, fig. 1.
— — *Bronn.* 1848. Index Palæont., p. 785.
— — *D'Orb.* 1850. Prod. Paléont., p. 299.

N. Testá ovatá, spirá parva, apicè submamillato; anfractu ultimo elongato, basi lata; aperturá supernè angustatá; labro interno calloso convexiusculo.

Shell ovate, spire small; apex submamillated, last whorl elongated, its base wide; aperture narrow above; lip somewhat thickened, straight, and convex.

The straight border of the inner lip, its convexity, and the minute spire, sufficiently characterise it. The spire consists of 5 or 6 whorls, of which the first two or three form a minute mamillated apex. Our figures sufficiently represent the varieties of form, of which the more elongated is the most common. The planking contains it not unfrequently; and some beds in the upper limestones contain numerous casts, which can scarcely be referred to any other shell.

Length of the globose variety 18 lines, width 16 lines; length of the elongated variety 18 lines, width 13 lines.

Locality. Minchinhampton. Eparcy and Sancerre, France.

NATICA AMBIGUA. Plate VI, fig. 5.

? CASSIS EPARCYENSIS, *Archiac.* 1843. Mém. Soc. Géol. France, tom. v, p. 385, pl. 31, fig. 10.
? ACTEONINA EPARCYENSIS, *D'Orb.* 1850. Prod. Paléont., p. 299.

N. Testâ hemisphæricâ, spirâ parvâ, depressâ; apice acuto; anfractibus angustatis, planis, anfractu ultimo ventricoso; aperturâ ellipticâ.

Shell hemispherical, spire small, depressed; the apex acute; whorls narrow and flattened, the last whorl ventricose; aperture of moderate size, and elliptical; inner lip rounded.

The general figure approaches to globular, except at the base of the spire, which is flattened, and only the small volutions rise above the wide and flattened upper surface of the last whorl; the base is comparatively narrow; the inner lip is gracefully curved, but not apparently thickened, nor is there any trace of an umbilical fissure. One specimen only was obtained in the planking. It is imperfect about the outer lip, and scarcely half the dimensions of the shell figured by D'Archiac. Length 10 lines, breadth 10 lines.

Locality. Minchinhampton; Eparcy, France.

Sub-Genus—Euspira, *Ag.*

Shell smooth, ovate; spire elevated; of few whorls, which are angulated, the angles sometimes taking the form of a carina; less frequently the last whorl has a second carina, or the carina becomes nodulous or tuberculated; aperture entire, elliptical, modified by the angle of the whorl; base wide, rounded; pillar lip smooth and excavated, outer lip thin and smooth.

The Great Oolite shells referable to this genus are all rare. One of them, however (*E. canaliculata*), though rare in this formation, is abundant in the middle division of the Inferior Oolite.

Euspira canaliculata.* Plate XI, fig. 23, 23*a*.

E. Testâ oblongâ, spirâ sub-exsertâ, apice acuto, anfractibus angulosis, angulis acutis; anfractibus superne profunde canaliculatis, inferne sub-convexis; anfractu ultimo obliquo, basi attenuatâ; aperturâ ellipticâ, fissurâ umbilici angustatâ.

Shell oblong, spire but little elevated, apex acute, whorls angulated, the angles acute, the upper portion of the whorls deeply channelled, their lower portions rather convex, the last whorl oblique, its base attenuated; aperture elliptical, the umbilical fissure narrow. Several obscure encircling lines may be traced upon the middle of the last whorl. The specific characters of this shell are so strongly marked that it will not readily be mistaken for any other; several specimens have been extracted from the limestone beds in the upper portion of the Great Oolite: but in the middle beds of the Inferior Oolite in Gloucester-

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[1] Although we have provisionally arranged this and the four following species under a sub-genus of *Natica*, they present considerable affinities to the Palæozoic genus, *Scalites* (Hall), in the lines of growth having the appearance of a slight fissure where the angle occurs in the volution.

shire it is much more common. Length 14 lines, breadth 12 lines, length of aperture 10 lines, breadth 6 lines.

Locality. Minchinhampton.

EUSPIRA SHARPEI. Plate XI, fig. 22.

E. Testá oblongá; spirá elatá, apice acuto, anfractibus angulosis; angulis acutis et prominentibus, superne tabulatis, inferne planis; aperturá magná, labro sinistro excavato et umbilicato.

Shell oblong, spire elevated, its apex acute, volutions angulated, the angles acute and prominent, the upper surfaces of the whorls nearly flat, but rising a little towards the suture, the lower portion flattened; aperture large, inner lip excavated with an open umbilicus.

This species most nearly resembles *E. canaliculata,* but in the present shell the spire is very much more elevated; the upper surfaces of the whorls are not channelled, and their lower portions are not convex.

Locality. Minchinhampton. It is very rare, and has been found only in the planking. Length 18 lines, breadth 15 lines.

Named in compliment to D. Sharpe, Esq., F.R.S.

EUSPIRA PYRAMIDATA. Plate VI, fig. 8, 8*a*.

E. Testá ovatá, spirá elatá, pyramidatá, apice acuminato, anfractibus (4) *angulatis; angulo in carinam obtusam producto; anfractibus superne tabulatis, inferne planis, aperturá ovatá, basi rotundatá, fissurá angustá.*

Shell ovate, spire elevated, pyramidal, apex pointed, whorls (4) angulated, the angle forming an obtuse carina; upper surface of the whorls tabulated, lower flattened, aperture ovate, base rounded, umbilical fissure narrow.

In this species the spire and aperture are nearly of equal length, beneath the angle of the body whorl a slight depression is perceptible; the flattened upper area of the whorls is narrow compared with the other contemporaneous species.

Locality. Minchinhampton. It occurs in the planking, and is rare.

EUSPIRA CORONATA. Plate VI, fig. 9.

E. Testá subglobosá, spirá elatá, anfractibus (4—5) *angulatis, angulis nodulatis; nodulis numerosis; anfractibus superne tabulatis, inferne subplanis; anfractu ultimo globoso, carinis duobus nodosis cincto; aperturá magná ellipticá, basi rotundatá; umbilico parvo.*

Shell subglobose, spire elevated, whorls (4—5) angulated, the angles nodulated, the nodules being small and numerous; the whorls are flattened above and beneath the angle; the last whorl is globose, and has two encircling nodulous carinæ, with a depression between them; the aperture is large and elliptical; the base rounded and wide; the pillar lip with an open umbilicus.

This may be regarded as an aberrant form of *Euspira*, in which the carina becomes nodulous; the nodules, however, are not prominent nor large, those of the second carina being smaller, more numerous, and rather indistinct. There is also a slight sulcus between the carinæ which are connected together by obscure elevations, but these merely appear as slight plications. The general form being globose, and the carina broken into nodules, renders its aspect less angular than is usual in the genus. Length 21 lines, breadth 19 lines.

Locality. Minchinhampton: the planking has furnished our only example.

EUSPIRA SUBCANALICULATA. Plate VI, fig. 13.

E. Testá oblongá; spirá sub-exsertá; anfractibus (4) *angulosis, marginibus subdepressis, supernè tabulatis, infernè subconvexis; anfractu ultimo obliquo; aperturá subtrigoná; obliquá, basi angustatá; labro interno calloso umbilicum obtigente.*

Shell oblong; spire but little elevated; whorls (4) angulated, their margins rather depressed, flattened above the angle, and rather convex beneath; the last whorl oblique; aperture subtrigonal, the last whorl oblique, the base narrow; the inner lip thickened, and covering an umbilicus.

Unfortunately we possess only one specimen of this little shell, which was obtained in the planking; it may possibly be a young variety of *E. canaliculata*, in which the upper portions of the whorls may become channelled with advance of growth, and the general figure more globose; the appearance of the inner lip and umbilicus, however, are certainly different; and we, therefore, prefer to keep this as a distinct species. Length 8 lines, breadth 7 lines.

Locality. Minchinhampton.

Family—PYRAMIDELLIDÆ.

EULIMA, *Risso.* 1826.

Turreted, smooth, pyramidal; spire long, consisting of numerous whorls; apex acute, slightly tortuous; aperture oval, rounded anteriorly; outer lip slightly thickened; columella smooth.

Eulima communis. Plate IX, figs. 21, 21*a*.

E. Testâ turritâ, lævigatâ; spirâ regulari, obtusâ; anfractibus subplanis in ætate juniori, ætate progrediente convexis; aperturâ ovatâ; labro tenui.

Shell turreted, smooth; spire regular, obtuse; whorls rather flattened in the young state, but with advanced age more convex; aperture ovate; lip thin.

When young the shell is much more flattened and obtuse; but in all stages of growth the junctions of the whorls are strongly marked—the oldest specimens have the lines of growth strongly developed upon the last volution. The contrast between the peculiar flatness and almost conical figure of the young shells and older specimens which have lost their apex is so great, that without the assistance of intermediate forms they would probably be regarded as distinct species. The length never exceeds an inch.

Locality. This is decidedly the most common univalve of the Great Oolite, and occurs in all the shelly beds, more especially in the soft shelly Oolite beneath the planking at Minchinhampton Common.

Eulima pygmæa. Plate IX, fig. 1.

E. Testâ lævigatâ, turritâ; spirâ obtusâ; anfractibus paucis, subplanis; aperturâ subcontractâ.

Shell smooth, turreted; spire obtuse; whorls few, nearly flat; aperture oblique, and somewhat contracted laterally.

The last whorl is large, its length being half of that of the entire shell; the obtuseness of the spire, fewer volutions, nearly cylindrical figure, and obliquity of the aperture, separate it from *E. vagans.*

Locality. A single specimen is all we have met with: it occurred in the white stone of Bussage.

Eulima vagans. Plate IX, figs. 3, 4.

E. Testâ turritâ, lævi, elatâ; spirâ acutâ, anfractibus paucis subplanis; aperturâ ovatâ; labro dextro subexpanso.

Shell turreted, smooth, elevated; spire acute; whorls few, high, and nearly flat; aperture ovate; right lip somewhat expanded.

The last whorl is nearly equal in length to all the others together.

Locality. It occurs in the shelly planking rarely; and a few casts have also been obtained in the upper portion of the formation, east of Minchinhampton.

Eulima subglobosa. Plate IX, fig. 6.

E. Testâ lævi, ovato-conicâ; spirâ subcontortâ; anfractibus convexis, angustatis, anfractu ultimo subgloboso; aperturâ obliquâ, ovatâ.

Shell smooth, ovately conical; spire rather contorted; whorls convex, narrow, the last whorl subglobose; aperture oblique and ovate.

A small globose species, the spire of which is rather angular, its length being somewhat less than that of the last whorl.

Locality. It is rare, and occurs in the soft shelly Oolite of Minchinhampton Common.

Chemnitzia, *D'Orbigny.* 1839.

Shell turreted, elongated, not umbilicate; volutions numerous, frequently costulated; aperture oval or angular, anteriorly large, retracted posteriorly; columella straight and smooth; outer lip thin and smooth.

Chemnitzia Lonsdalei. Plate VIII, figs. 13, 13*a*.

C. Testâ turritâ, apice acuto, lævigato; anfractibus in medio profundè constrictis vel sulcatis, suturis vix impressis; aperturâ, elongato-ovatâ, superne constrictâ.

Shell turreted, elongated, acute, smooth; whorls deeply constricted, or sulcated in their middle part; sutures of the whorls sometimes scarcely distinguishable; aperture elongated and ovate, narrow posteriorly.

For the first four volutions the mesial depression is but slightly marked; but it gradually increases in depth, the last two or three whorls being deeply grooved. Several oolitic species approach this shell, more especially the *Melania lineata* of the Mineral Conchology and the *M. procera* of Deslongchamps; in the latter species, however, the concavity of the whorls is always very slight, and is sometimes not appreciable. Axis 3 inches 3 lines; transverse diameter 10 lines; length of aperture 10 lines; breadth of aperture 5 lines.

Locality. Our species is moderately rare; it has been found only in the planking of Minchinhampton Common.

Named after W. Lonsdale, Esq., F.G.S., whose valued contributions to Geology, especially among the oolitic series, are well known.

Chemnitzia simplex. Plate VII, fig. 15.

C. Testâ magnâ, turritâ, elongatâ, lævi; anfractibus convexis, suturis profunde impressis, aperturâ obliquâ ovatâ; columellâ marginatâ, rotundatâ, subrectâ; labro interno effuso.

Shell turreted, elongated, smooth; whorls convex, the sutures deeply impressed, aperture oblique, ovate; columella marginated, rounded, nearly straight; inner lip effuse.

In this large species the volutions are high and globose, the base of the shell is rather contracted.

Locality. The few specimens found, have been obtained from the planking; the fine example figured is from the hard weatherstone of Bisley Common.

CHEMNITZIA HAMPTONENSIS. Plate VII, figs. 1, 1*a*.

C. Testâ elongato-conicâ, spirâ mediocriter obtusâ; anfractibus (10—11) *planis et costatis; costis longitudinalibus* (20—22) *numerosis, rectis, vel subflexuosis; aperturâ parvâ, ellipticâ.*

Shell conical, but much elongated; spire, with the apex, somewhat obtuse; whorls (10—11) flattened and costated; costæ numerous, perpendicular, but slightly bent in the middle, inclining from left to right; aperture small, and elliptical.

The whorls are narrow, their axis being equal only to half their transverse diameter; the costæ are narrow, and moderately elevated in young specimens, but after seven volutions have been formed, became much more faintly marked, and finally are obsolete; the less subulate form and very narrow whorls separate it from *Terebra vetusta* (Phil. Geol. York., t. 9, f. 11), to which the markings upon its surface have a near resemblance. Axis of largest specimen 15 lines; transverse diameter 5 lines.

Locality. Minchinhampton Common and vicinity, where it is moderately rare: it is usually found in the soft oolite beneath the planking.

CHEMNITZIA LECKENBYI. Plate VII, fig. 4.

C. Testâ parvâ, lævigatâ, subulatâ; anfractibus numerosis, subplanis, supernè convexis, anfractu ultimo symmetrico.

Shell small, smooth, subulate, acute; whorls numerous, narrow, flattened, except upon their upper portions, where they are convex; the last whorl symmetrical.

This small species approaches in figure two contemporaneous species, viz., the young state of *Nerinæa Voltzii* and of *Eulima? communis;* from the former of these it is distinguished by the greater flatness of the whorls; from the young state of the latter by the much greater number of whorls, more subulate form, and acute apex. Axis 3½ lines.

Locality. Minchinhampton Common.

CHEMNITZIA WETHERELLII. Plate VII, figs. 5, 5*a*.

C. Testâ cylindrico-elongata; anfractibus numerosis (12) *subconvexis, longitudinaliter costatis; costis* (14) *rectis obtusis; aperturâ parvâ, ovatâ.*

Shell cylindrical, elongated, whorls numerous (about 12), somewhat convex, longitudinally costated; costæ perpendicular, obtuse, closely arranged, about 14 in a volution; aperture small, ovate.

A small, slender species, with closely-arranged costæ, which are rather large, but not much elevated; the sutures of the whorls are strongly marked; it is rare, but has occurred in more than one of the shelly beds. Axis 10 lines; transverse diameter 2 lines.

Locality. Minchinhampton Common.

This species is named in compliment to our kind and liberal friend, N. T. Wetherell, Esq., F.G.S.

Chemnitzia variabilis. Plate VIII, figs. 7, *7a, b.*

C. Testá turritá, subulatá; anfractibus convexiusculis, transversim striatis, plus minusve crenulatis, longitudinaliter costatis, costis curvatis circa 12 *in ambitu; costis interdum interruptis nodulosis; aperturá ellipticá obliquá; columellá marginatá.*

Shell turreted, subulate; whorls rather convex, transversely striated, striæ more or less longitudinally costated, costæ curved, about 12 in a volution; ribs sometimes obsolete, and replaced by nodules; aperture elliptical, oblique; columella marginated.

Specimens differ in the convexity of the whorls, those which are most convex have the ribs shortest, or reduced merely to nodules placed upon the upper border of each whorl: in all specimens the costæ become obsolete before reaching the base of each whorl. Occasionally upon the same specimen the ribs degenerate into nodules, only the smaller whorls are then costated. This species was first mistaken for *Melania undulata* (Deslongchamps); but in that shell the sides of the volutions are flat, the costæ are more numerous, and extend to the junction of the whorls, and have no curvature except in the last one; they are likewise less subulate than in our species. Axis 5 lines; transverse diameter 1½ lines.

Locality. It is abundant in all the shelly beds of the Great Oolite, near Minchinhampton.

Chemnitzia phasianoides. Plate IX, fig. 5.

C. Testá ovato-subcylindricá, spirá elatá, apice obtuso; anfractibus (5) *planis, anfractu ultimo subcylindrico, elongato; aperturá obliquá; labro dilatato.*

Shell ovately-subcylindrical, spire elevated, apex obtuse, whorls (5) flattened, the last whorl subcylindrical, elongated; aperture oblique; outer lip dilated.

This species has a considerable resemblance to *Eulima vagans,* but the spire is much shorter, the whorls are fewer, and the apex is more obtuse; the aperture is rather narrow, its length being two fifths of the entire shell.

Locality. The planking of Minchinhampton Common has furnished our specimens.

Family—LITTORINIDÆ.

RISSOINA, *D'Orbigny*. 1842.

Shell turreted, acuminated; spire long, consisting of several whorls; aperture oval, rather pointed at the two extremities; outer lip thickened, emarginated; columella rounded, straight.

RISSOINA DUPLICATA, *Sow.* Plate IX, fig. 10.

RISSOA DUPLICATA, *Sow.* 1829. Min. Con., t. 609, fig. 4.
— — *Brown.* Illust. Foss. Conch., t. 38, figs. 14, 15.
— *Morris.* Cat. Brit. Fossils, p. 161.
— — *Bronn.* Index Palæont., p. 1092.
RISSOINA DUPLICATA, *D'Orb.* Prod. Paléont., p. 297.
— — *D'Orb.* Pal. Franç. Terr. Jurass., t. 237, figs. 1, 2.

A. Testâ parvâ turritâ, acutâ; anfractibus (6) *in medio angulatis; costulis longitudinalibus angustatis, remotiusculis; carinâ unicâ in medio anfractuum sitâ; anfractu ultimo, costulis numerosis longitudinalibus rectis ornato, carinâ evanescente.*

Shell small, turreted, acute; whorls (6) angulated, with remote, narrow, longitudinal costæ; each whorl has a low carina, situated a little beneath its middle part; the last whorl has very numerous small, longitudinal and straight ribs; the carina is scarcely discernible upon the last whorl. The costæ upon the last whorl are twice as numerous as upon the spire, and the figure of the whorl is nearly cylindrical, or slightly biangulated; and the carina becomes obsolete; the *Rissoa unicarina* of Buvignier, and the *Fusus carinatus* of Roëmer, approach very nearly to this species, with which they may possibly be identical; judging from the descriptions, however, there are certain points of distinction which appear to separate them from our species. Length 2 lines.

Locality. Ancliff and Minchinhampton Common; at the latter place it is very rare, and found only in the beds of planking.

RISSOINA OBLIQUATA, *Sow.* Plate IX, fig. 19.

RISSOA OBLIQUATA, *Sow.* 1829 Min. Con., t. 609, fig. 3.
— — *Brown.* Illust. Foss. Conch., p. 79, t. 38, figs. 19, 20.
— — *Bronn.* Index Palæont., p. 1093.
RISSOINA OBLIQUATA, *D'Orb.* Prod. Paléont., p. 297.

R. Testâ turritâ, turbinatâ, acutâ; anfractibus (6—7) *convexis et costatis; costis à dextro ad sinistram obliquis.*

Shell turreted, turbinated, acute; whorls (6—7) convex and costated; costæ oblique, directed from right to left.

The costæ are rather more elevated than in *R. acuta,* and the entire figure is more turbiniform, the whorls being much more convex. Length from 2½ to 3 lines.

Locality. Ancliff; also very rarely at Minchinhampton Common, in the planking.

RISSOINA ACUTA, *Sow.* Plate IX, fig. 9.

RISSOA ACUTA, *Sow.* 1829. Min. Con., t. 609, fig. 2.
— — *Brown.* Illust. Foss. Conch., p. 79, t. 38, figs. 25, 26.
— — *Bronn.* Index Palæont., p. 1090.
RISSOINA ACUTA, *D'Orb.* Prod. Paléont., p. 297.

R. Testâ parvâ, turritâ, acutâ; anfractibus convexiusculis 6, *costulis angustatis subremotis longitudinalibus; aperturâ ovatâ; labio dextro expanso.*

Shell small, turreted, acute; whorls (6) slightly convex, with narrow, rather remote, longitudinal ribs; aperture oval; right lip expanded.

The surface is nearly smooth; the longitudinal ribs, or rather lines, scarcely affecting the evenness of the surface; it is the most slender example of the genus which the Great Oolite has produced. Length, 3 lines.

Locality. Ancliff; and very rarely Minchinhampton Common, in the planking.

RISSOINA CANCELLATA. Plate IX, figs. 12, 12*a*.

R. Testâ turbinatâ, turritâ, acutâ; anfractibus convexis (8), *angustis, transversè costatis; costis* (6—7) *inæqualibus, lineis longitudinalibus decussatis; aperturâ latâ.*

Shell turreted, turbinated, acute; whorls convex (8), narrow, transversely costated; costæ (6—7) unequal, decussated by longitudinal lines; aperture wide.

The upper costæ of each whorl are smaller and more approximated than the lower; the convexity of the whorls is chiefly upon their lower portions; the fine longitudinal lines crossing the narrow encircling costæ give to the surface a cancellated aspect; the aperture is acute above, rounded beneath.

Locality. The soft Oolite beneath the planking of Minchinhampton Common furnished this pretty little shell, of which we have not seen another example.

RISSOINA TRICARINATA. Plate IX, fig. 13.

R. Testâ parvâ, turbinatâ, acutâ; anfractibus convexis; tricarinatis; carinis crenulatis; carinâ superiore apud suturam positâ; aliis in medio et approximatis; anfractu ultimo ad basem lineis tenuissimis notato; aperturâ parvâ, suborbiculari.

Shell small, turbinated, acute; whorls very convex, and thrice carinated; carinæ crenulated, the upper one placed near to the suture; the others about the middle of the whorl, and near together; the last whorl has near to its base very fine encircling lines; the aperture is small, and nearly orbicular.

In this minute shell the largeness and roundness of the carinæ, and the great convexity of the whorls are the most prominent features.

Locality. We have procured two specimens from the white stone of Bussage; but in this, and probably other instances of minute shells, the small number known may indicate rather our defective observation than the true relative numbers which they present.

RISSOINA? LÆVIS, *Sow.* Plate IX, fig. 16.

RISSOA LÆVIS, *Sow.* 1829. Min. Con., t. 609, fig. 1.
— — *Brown.* Illust. Foss. Conch., p. 79, t. 38, fig. 12.
— — *Bronn.* Index Palæont., p. 1092.

R. Testâ parvâ, turritâ, lævi, subcylindricâ; anfractibus (6) *subplanatis; anfractu penultimo, et ultimo subcylindrico; aperturâ parvâ, obliquâ.*

Shell small, turreted, pointed, smooth, and subcylindrical; whorls (6) rather flattened; the last whorl, and also the penultimate whorl, are nearly cylindrical; aperture small and oval, oblique. Length 2½ and 3 lines.

Locality. Ancliff; also very rarely at Minchinhampton Common, where it has been found in the planking.

This species scarcely exhibits the anterior notch characteristic of *Rissoina.*

PAGODUS, *Gray.*

Sub-genus—AMBERLYA.

P. Testâ turritâ, turbinatâ, apice acuto; anfractibus supernè planis, infra convexis et nodulatis; anfractu ultimo ventricoso; aperturâ ovatâ, integrâ, labio interno calloso umbilicum vix obtigente; suturis profundè impressis; columellâ nullâ.

Shell turreted, turbinated, apex acute; whorls flattened above, convex, and nodulated beneath, the last whorl ventricose; aperture ovate, entire; inner lip thickened, and nearly covering a small umbilicus; sutures deeply impressed; no columella.

The whorls are received into the concavity of those which succeed, the latter at their junctions being slightly overwrapped by the former, after the manner of *Scalaria;* the aperture is oval and oblique; the outer lip thin; the figure varied somewhat according to the stage of growth, the last one or two volutions in adult specimens becoming more tumid than the others; in such examples, therefore, the spire acquires a slightly concave figure.

This shell may be considered to form only a section of *Littorina,* agreeing in the general characters with the genus *Pagodus* of Gray, with which, probably, the discovery of more perfect specimens may assimilate it.

AMBERLEYA (PAGODUS) NODOSA. Plate V, fig. 19.

TEREBRA NODOSA, *Buckman.* 1845. Geol. of Cheltenham, p. 102.

A. Testâ turritâ, ventricosâ; spirâ elatâ, apice acuto; anfractibus (6) *infra nodulosis, nodulis numerosis supernè apud suturam cingulo nodulorum minorum ornatis; anfractu ultimo basi costulis obscuris tribus cincto.*

Shell turreted, ventricose; spire elevated; apex acute; whorls (6) convex on their lower portions, and nodulated; the nodules closely arranged, and forming a small belt near to the base of the whorl; another, much smaller and indistinct, circle of nodules encompasses the whorls upon their upper portions near to the suture; the last whorl has at its base three indistinct, narrow, encircling costæ.

The number of nodules gradually increases in each volution, the last whorl having about 18; the last two volutions are very ventricose, which give to the spire a slightly concave figure; in the younger state, consequently, the figure is more slender than in the adult. Our two specimens, which are of different stages of growth, present the following proportions: — *Adult.* Axis 24 lines, transverse diameter 15 lines, length of aperture 11 lines, breadth of aperture 8 lines. *Young state.* Axis 16 lines, transverse diameter 9 lines, length of aperture 6 lines, breadth 4½ lines.

Locality. It is very rare, the planking of Minchinhampton Common has furnished five examples, and several imperfect casts have been obtained in the Stonesfield slate at another place in the same vicinity: these casts have enabled us to ascertain the absence of a central columella.

Obs. The specimen submitted to the artist was rather imperfect at the base of the aperture, which, together with the position, give it the aspect of a regular notch at that part of the shell.

Family—NERITIDÆ.

NERITA, *Linn.* 1758.

Shell semiglobose; spire short, sometimes not produced, consisting of few volutions; aperture large, semilunar; outer lip thick, inner lip thickened, usually flattened, and striated or dentated at its inner edge.

The fossil species of *Nerita,* from the Great Oolite, may be divided into the three following sections, as dependent on the character of the inner lip:—

SECT. 1. Inner lip smooth.

N. Testâ crassâ, subhemisphæricâ; spirâ parvâ obliquâ, depressâ; anfractibus paucis, carinatis; aperturâ semilunari; labio dextro crasso, labio interno planato, amplo.

Shell thick, subhemispherical; spire small, oblique, depressed; whorls few, carinated; aperture semilunar; outer lip thick and smooth; inner lip flat, broad, and smooth, without notch or striæ.

NERITA CANCELLATA. Plate XI, fig. 15, 15*a*.

N. Testâ crassâ, hemisphæricâ; spirâ parvâ, depressâ, obtusâ; anfractibus (3) *carinis tribus cancellatis; carinis obtusis, striis longitudinalibus decussatis, et lineis inæqualibus et irregularibus cinctis; aperturâ transversè oblongâ.*

Shell thick, hemispherical; spire small, obtuse, depressed; whorls (3), with three carinæ cancellated; carinæ obtuse, decussated with longitudinal striæ: the last whorl has also irregular, unequal, encircling lines, which form, with the longitudinal striæ, a cancellated surface; aperture transversely oblong; inner lip very wide.

The most frequent aspect is that of a very rugose, depressed *Nerite*, with large, obtuse carinæ and intermediate sulcations; the distinctly cancellated surface is observable only in the younger examples. The first and second carinæ are placed near together; between these and the basal carina is a large surface, with encircling lines crossing the striæ. Portions of coloured surface are sometimes observed upon the carinæ and upper portion of the last volution.

Locality. It is moderately rare at Minchinhampton Common and Bussage.

NERITA RUGOSA. Plate XI, fig. 17, 17*a*.

R. Testâ hemisphæricâ; spirâ parvâ, depressâ; anfractibus (2 *vel* 3) *carinato-striatis; ultimo anfractu subangulato, carinis tribus* (*carinâ mesâ majore*), *et striis profundis longitudinalibus plùs minùsve crebris; coloribus fuscis sæpè pictis; labio interno, lato, planato.*

Shell hemispherical; spire small, depressed; whorls (2 or 3) carinated and striated; the last whorl subangulated, having three carinæ, of which the middle one is the most prominent and rounded; the last whorl has, also, longitudinal, deeply-marked striæ, more or less closely arranged, and not unfrequently marked with colours, arranged into two broad encircling bands, separated by the mesial carina.

The longitudinal striæ might sometimes, with more propriety, be termed costæ; when the costæ are large and distant the carinæ are likewise most prominent, and occasionally both conditions may be observed in the growth of the same specimen—the smaller examples being such as usually have the most widely-separated longitudinal lines or striæ. The surface markings vary so considerably that they may be conveniently described under the three following aspects:—

a′. Ribs elevated and separated; carinæ smooth and prominent.

b′. Surface with longitudinal closely-arranged plications, but no distinct ribs; plicæ impressed with very fine longitudinal lines.

c′. In which the characteristics of the two former varieties are sometimes exhibited upon the same specimen, in which case the carinæ are imperfect, or, in lieu of them, there are slight depressions or furrows.

The most common aspect is that of the variety *a′*. It is one of the most generally-noticed univalves of the shelly beds. Very rarely all traces of ribs and plications are wanting, the surface is then shining, smooth, and highly coloured. The dimensions vary from that of a duck-shot to the largest-sized pea.

Locality. Minchinhampton Common. In all the shelly beds of the district.

NERITA COSTULATA, *Desh.* Plate VIII, figs. 6, 6*a*, *b*, *c*. Plate XI, figs. 18, 18*a*, *b*.

NERITA COSTATA, ***Sow.*** 1824. Min. Con., t. 463, figs. 5, 6.
— — ***Phillips.*** Geol. of Yorkshire, vol. i, t. 11, fig. 32.
— — ***Brown.*** Illust. Foss. Conch., p. 91, t. 44, figs. 1, 2.
— COSTULATA, ***Desh.*** 1838. Lam. Anim. sans Vert., 2d Edit., vol. viii, p. 617.
— — ***D'Orb.*** 1850. Prod. Paléont., p. 299.

N. Testâ parvâ; spirâ obliquâ depressâ, minutâ, vix elatâ; anfractu ultimo supernè planato, costis longitudinalibus, numerosis, subundatis, et approximatis ornato.

Shell small; spire oblique, depressed, minute, scarcely elevated; the last whorl flattened upon its upper portion, and covered with costæ, which are longitudinal, numerous, closely arranged, and slightly waved; the aperture is very large, the inner lip very wide and flat.

The absence of carinæ at once distinguishes this little shell from our *Nerita rugosa,* for one variety of which it might otherwise be mistaken. It has not been found in the Minchinhampton Great Oolite, but occurs occasionally in the Inferior Oolite of that district. Axis 2 lines.

Locality. Ancliff; Stonesfield. *Inf. Ool.*, Yorkshire.

SECT. 2. Inner lip convex. Neridomus.

N. Testâ lævigatâ, ovato-globosâ; spirâ parvâ, obliquâ; anfractu ultimo permagno; aperturâ ovatâ, vel semilunari; labio externo crasso; labio interno crasso, convexo et lævigato.

Shell smooth, ovately globose; spire small, oblique; the last whorl very large; aperture ovate, or semilunar; outer lip thick; inner lip thick, convex, and smooth.

Nerita hemisphærica, *Roèmer.* Plate XI, fig. 16, 16*a*; 14, 14*a*.

Nerita hemisphærica, *Roemer.* 1836. Nordd. Oolith., p. 156, t. 10, fig. 7.

N. Testá lævigatá, transversá ovali-hemisphæricá; spirá parvá, prominulá; aperturá semilunari; labio interno magno, convexo et incrassato.

Shell smooth, transverse, ovately hemispherical; spire small; aperture semilunar; inner lip large, convex, and incrassated.

The surface of this species varies considerably; the younger specimens being smooth, and not unfrequently exhibiting portions of colouring in dark, encircling lines: the older specimens are rendered rugose by numerous large plications of growth. It is not uncommon, being found in all the shelly beds, more especially in the coarse planking.

Locality. Minchinhampton Common.

Nerita minuta, *Sow.* Plate XI, figs. 19, 19*a*.

Nerita minuta, *Sow.* 1824. Min. Con. t. 463, figs. 3, 4.
— — *Desh.*, 1838. Lam. Anim. sans Vert., 2d Edit., vol. viii, p. 617.
— — *D'Orb.* 1850. Prod. Paléont., p. 299.
— pulla, *Roemer.* 1836. Nordd. Oolith., p. 155, t. 9, fig. 30.
— ovata, *Roemer.* Nordd. Oolith., p. 156, t. 10, fig. 6.
— mais, *Buvignier.* 1843. Mém. Soc. Phil. Verd., t. 5, figs. 18, 19.

N. Testá parvá lævigatá; spirá obliquá exsertá et minutá; anfractu ultimo coloribus lineatis undulatis sæpissimè picto.

Shell small, smooth; spire oblique and minute; the last whorl most commonly exhibits undulating-coloured lines, which occasionally coalesce, and are very irregular.

This little shell is a longer oval figure than both *Nerita hemisphærica* (Röm.) and *Neritina Cooksoni* (Desl.); the latter little species, with which it nearly agrees in size, is more globose, and has a larger, more prominent, and less oblique spire than *N. Pulla.*

N. minuta occurs abundantly in all the shelly beds; its surface is very smooth and shining; the most frequent size is that of duck shot; the longer diameter not exceeding two lines.

Locality. Minchinhampton Common and neighbouring district.

Sect. 3. Inner lip notched. Neritopsis, *Grateloup.* 1840.

N. Testá crassá, neritiformi, ovato-globosá; spirá parvá, obliquá, anfractu ultimo inflato, costis numerosis cincto; aperturá suborbiculari, labro externo incrassato et lævigato, labio interno concavo, sulco lato margine excavato.

Shell thick, neritiform, ovately-globose; spire small, oblique; the last whorl inflated, encircled with numerous costæ; aperture suborbicular; the outer lip thickened, but smooth; the inner lip concave, with a wide notch upon its inner border.

Neritopsis striata. Plate XI, figs. 13, 13*a*.

N. Testâ ovatâ; spirâ elatâ; anfractibus tribus, convexis; anfractu ultimo costis numerosissimis crebris cincto, costis subundulatis; aperturâ amplâ, ovatâ.

Shell ovate; spire elevated; whorls (3) convex; the last whorl encircled with numerous and closely-arranged costæ, which slightly undulate; aperture large and ovate.

The costæ are narrow, but slightly elevated, the interstitial spaces being so narrow as to appear like striæ; hence, in badly-preserved specimens, the costæ can scarcely be discerned; the spire is small, moderately prominent, and has its surface distinctly sculptured in good examples: the specimen figured is rather beneath the average size.

Locality. Minchinhampton Common, where it occurs somewhat rarely in the soft, shelly oolite which underlies the planking.

Neritopsis sulcosa. Plate XI, fig. 12.

? Nerita sulcosa, *Archiac.* 1843. Mém. Soc. Géol. Fr., vol. v, tab. 28, fig. 8. (Non *Brocchi.*)

N. Testâ ovatâ; spirâ parvâ; anfractibus tribus vel quaternis, convexis, sulco lato spirali supernè instructis; anfractu ultimo permagno, cingulis inæqualibus, numerosis, et magnis ornato.

Shell ovate; spire small; whorls (3 or 4) convex, with a wide, encircling sulcus upon their upper portions; the last whorl very large, with numerous, unequal, and large encircling bands.

The encircling ribs extend only upon the last volution, their inequality and large size give to the surface a rugose aspect; the sulcus upon the upper part of the last whorl is without costæ; the specimen figured is of the largest dimensions.

Locality. Minchinhampton Common, where it occurs somewhat rarely in the shelly beds of coarse planking.

Pileolus, *G. B. Sowerby*, 1823.

"Shell conical, with a subcentral upright vertex; base concave, with a thin margin and tumid centre; aperture small, within the margin of the base, sublateral, semilunar, its outer lip prominent, the inner one crenulated; spire internal, very short."—*Sowerby.*

Pileolus plicatus, *Sow.* Plate IX, figs. 36, 36*a, b, c.

Pileolus plicatus, *G. B. Sow.* 1823. Genera of Shells, No. 19, figs. 1—4.
— — *Sow.* Min. Con., t. 432, figs. 1—4.
— — *Bronn.* Leth. Geogn., p. 392, t. 27, fig. 6.
— — *Brown.* Illust. Foss. Conch., p. 92.
— — *D'Orb.* 1850. Prod. Paléont., p. 299.
— — *Bronn.* Index Palæont., p. 973.
Patella costatula, *Goldfuss.* Petref., t. 177, fig. 9.

P. Testâ turbinatâ; ambitu orbiculari; verticè elato, subacuto, erecto; costis radiantibus majoribus (16) *acutis, minoribus intermediis; costis posterioribus maximis; margine dentatâ; basi in medio convexiusculâ, ad peripheriam subconvexâ; peripheriâ integrâ aut subsinuatâ.*

Shell turbinated, suborbicular, summit elevated, erect, and rather acute; ribs radiating, the larger series (16 in number) are acute, with smaller ones between them; the posterior ribs are the largest and most distant; the margin is toothed, the base is convex in its middle part, and slightly convex at the periphery; the periphery is entire, and slightly sinuated.

Four of the posterior ribs occupy one third of the circumference; they are more elevated and distant than the others. The specimens of this species in the Great Oolite never occur of so large a size as those of *P. lævis;* the usual basal diameter being about 3 lines, and very rarely exceeding 4 lines. *Pileolus plicatus* is scattered, indifferently, over the shelly beds, but in fewer numbers than the other species; the shell being very thick and strong, is usually entire and uncompressed; both species are always found in the upright position.

Locality. Minchinhampton Common; Ancliff, Wiltshire; Langrune, France.

Pileolus lævis, *G. B. Sow.* Plate IX, figs. 37, 37*a, b.*

Pileolus lævis, *G. B. Sow.* 1823. Genera of Shells, No. 19, figs. 5—8.
— — *Sow.* Min. Con., t. 432, figs. 6—8.
— — *Brown.* Illust. Foss. Conch., p. 92, t. 44, figs. 16, 17.
— — *D'Orb.* 1850. Prod. Paléont., p. 299.
— — *Bronn.* 1848. Index Palæont., p. 973.
? Patella mamillaris, *Goldfuss.* Petref., t. 177, fig. 10.
? — papyracea, *Bronn.* Lethæa Geogn., pl. 27, figs. 7, *a, b.*

P. Testâ parvâ, conico-depressâ, lævi, aut sulcis raris, obsoletis notatâ; basi in medio convexiusculâ.

Shell small, conical, but much depressed; sometimes discoidal, smooth, or with a few faintly-marked longitudinal irregular sulcations; base rather convex in the middle part.

Specimens, as small as the head of a pin, are scattered over the blocks of white stone at Bussage, and planking at Minchinhampton Common—these are smooth. The larger shells are more distinctly sulcated, and occasionally attain a diameter of three eighths of an inch.

Locality. It occurs in all the shelly beds at Minchinhampton; at Ancliff, in Wiltshire; and at Charter House, Hinton, Somersetshire. Langrune, France.

Family—TURBINIDÆ.

TROCHUS, *Linnæus,* 1758.

Shell turbinated, conical; spire elevated, consisting of numerous whorls; under surface discoidal; aperture more or less depressed obliquely, entire, generally angular; columella curved, more or less prominent at its union with the outer lip, contiguous to the axis of the shell.

The fossil species of the Great Oolite are all very small, and are tolerably numerous in the shelly beds.

TROCHUS DUNKERI. Plate X, figs. 3, 3*a*.

T. Testâ conicâ, glabrâ; anfractibus lævigatis et planis (4—6); *apice acuto; aperturâ obliquâ, umbilico nullo.*

Shell conical, smooth; whorls very smooth and flattened; apex acute; aperture oblique; no umbilicus.

The extreme flatness of the whorls, and moderate elevation of the spire, are the chief features; the good specimens have oblique lines of growth upon the last whorl, near to the aperture.

Locality. This little species is tolerably abundant in the white stone of Eastcombs and Bussage.

Named after Dr. W. Dunker, Professor at the Polytechnic School of Cassel.

This species has some affinity with the *Trochus glaber,* Koch (*Goldf.* Pet. t. 1796. 12); but the volutions are striated and the base more convex.

TROCHUS PLICATUS, *Archiac.* Plate X, figs. 8, 8*a*.

TROCHUS PLICATUS, *Archiac.* 1843. Mém. Soc. Géol. France, vol. v, p. 379, t. 29, fig. 5.
— — *D'Orb.* 1850. Prod. Paléont., p. 300.
— — *Bronn.* 1848. Index Palæont., p. 1304.

T. Testâ turbinatâ; spirâ elatâ; anfractibus (5) *subconvexis, longitudinaliter costatis; costis* 12 *rectis elatis; basi lævi; aperturâ parvâ, depressâ.*

Shell turbinated; spire elevated; whorls (5) rather convex, longitudinally costated; costæ straight, elevated, smooth, about 12 in a volution; the base smooth; the aperture small and depressed; the sutures of the whorls are strongly marked. Axis 3 lines, basal diameter 6 lines.

Locality. The specimen figured is rather flattened; it occurred in the planking of Minchinhampton Common, and is more acutely conical than that figured by M. d'Archiac, of which it is considered to be only a variety.

TROCHUS IBBETSONI. Plate X, figs. 4, 4*a*.

T. Testâ conicâ, spirâ elatâ, obtusâ; anfractibus (5—6), *lævigatis et planis, aut subconvexis; aperturâ depressâ, obliquâ; umbilico nullo.*

Shell conical; spire elevated, obtuse; whorls (5—6) smooth and flattened, or slightly convex; aperture depressed, oblique; no umbilicus, columella lip thick and excavated.

This species somewhat resembles *T. Dunkeri,* from which it differs in the more elevated spire, obtuse apex, and somewhat convex form of the whorls; the base is, likewise, more convex and narrow: in the larger specimens these distinctive characters become more prominent, and the sutures of the whorls are strongly marked. It occurs together with *T. Dunkeri,* but in smaller numbers.

Locality. Eastscombs and Bussage.

The name in compliment to Capt. L. L. B. Ibbetson, F.R.S., whose geological surveys of the different railways have been of considerable interest to science.

TROCHUS SQUAMIGER. Plate X, figs. 2, 2*a*, *b*.

T. Testâ conicâ; apice obtuso; anfractibus (6—8) *subcompressis, suturis impressis; anfractibus cingulis quaternis tubuloso-squamosis; cingulo inferiori minimo; basi planâ et lævi; aperturâ depresssâ; umbilico nullo.*

Shell conical; apex obtuse; whorls (6) rather compressed, the sutures well marked; whorls with four circles of nodules or plications which are squamosely tubular or excavated towards the aperture, the lowest circle of nodules being much the smallest; the base is flat and smooth; the aperture depressed; no umbilicus.

In this species the height exceeds the basal diameter. It occurs not very unfrequently in the planking, a rock which usually adheres very closely to shells, and the plications become entangled with the particles of stone, so as to render good specimens very rare.

Locality. Minchinhampton.

TROCHUS BUNBURII. Plate X, fig. 1, 1*a*, 1*b*.

T. Testá conicá; apice acuto; anfractibus (5) *cingulatis; cingulis acutis inæqualibus, basi lævi; apertura obliquá.*

Shell conical; spire acute; whorls (5) cingulated; encircling ribs unequal, and varying in different individuals; the base smooth; the aperture oblique.

The costæ are very large, elevated, and unequal, so as to obscure the sutures of the whorls.

Locality. It is by far the most abundant of the Great Oolite species in the vicinity of Minchinhampton, and is common to all the shelly beds.

This species is named in compliment to E. H. Bunbury, Esq., M.P., F.G.S.

TROCHUS PILEOLUS. Plate X, figs. 5, 5*a*, 5*b*.

T. Testá turbinatá, lævissimá; anfractibus (4) *planis; apice obtuso; anfractu ultimo ad basin angulato; basi convexá; aperturá parvá.*

Shell turbinated, very smooth; whorls (4) flattened; apex obtuse; the last whorl encircled with a prominent rib near to the base; base convex; aperture small.

The very obtuse spire, and nearly cylindrical form of the last volution, give to the shell a cap-like figure.

Locality. From the white stone of Bussage. It is rare.

TROCHUS ANCEUS, *Goldf.* Plate X, figs. 7, 7*a*.

TROCHUS ANCEUS, *Goldfuss.* 1842. Petref., iii, p. 55, t. 180, fig. 3.
— — *Bronn.* 1848. Index Palæont., p. 1296.

T. Testá turbinatá, parvá, obliquè costatá, basi cingulatá; anfractibus (5—6) *tetragonis cingulatis; cingulis quaternis granulatis.*

Shell small, turbinated, obliquely costated, base cingulated; whorls (5—6) angular, encircled with four rows of granules.

Locality. Of this minute shell we have only obtained two examples, from the white stone of Bussage, and believe it to be rare.

The sutures in the specimens, figured by Goldfuss, are more distinct.

TROCHUS OBSOLETUS, *Roemer.* Plate XI, figs. 1, 1*a*.

TROCHUS OBSOLETUS, *Roemer.* 1836. Nordd. Oolith., p. 151, t. 11, fig. 5.
— — *Bronn.* 1848. Index Palæont., p. 1303.

T. Testâ conicâ; anfractibus tribus lævibus, lateribus planis; umbilico nullo; aperturâ depresso-ovatâ.

Shell conical; whorls (3) smooth, the sides flattened, no umbilicus; aperture depressed, ovate.

Possibly this may be the young of *T. glaber*, Dunker; the only apparent difference between them being, that *T. obsoletus* has a base wider in proportion to the height, and that the upper margins of the whorls are somewhat tumid, causing the sides to appear less flattened.

Locality. It is moderately common to all the shelly beds near Minchinhampton. In the Stonesfield slate of Wagboro' Bush (*Buckman*).

TURBO, *Linnæus*, 1758.

Shell thick, ventricose, turbinated, usually sculptured or tuberculated; spire short; aperture usually rounded, entire, somewhat spread out anteriorly.

TURBO HAMPTONENSIS. Plate IX, figs. 30, 30*a*, *b*.

T. Testâ parvâ, turbinatâ; anfractibus (4) *convexis, costulis* (4) *granulatis elatis cinctis; aperturâ orbiculatâ; umbilico parvo.*

Shell small, turbinated; whorls convex (4), turreted, encircled by four ribs, which are elevated and closely granulated; the aperture is nearly round; the umbilicus small.

Locality. A single, good example from the planking of Minchinhampton Common is all we have seen.

TURBO ELABORATUS. *Bean*, MS. Plate IX, fig. 27.

TURBO ELABORATUS, *Lycett.* 1850. Annals of Nat. Hist., vol. vi, p. 416, pl. 11, fig. 1.

T. Testâ conoideâ; anfractibus (4—5), *supernè planatis, infernè subconvexis, et costatis; costis magnis longitudinalibus numerosis et elatis, lineisque transversis decussatis; aperturâ ovatâ; umbilico nullo.*

Shell conoidal; whorls (4—5), their upper borders flattened or nearly horizontal, smooth; their lower portions slightly convex, with numerous elevated large, longitudinal costæ, decussated by numerous, closely-arranged transverse lines; aperture oval; no umbilicus.

Locality. The planking of Minchinhampton Common and white stone of Bussage have furnished this species, but it is rare at both localities; it has, likewise, been obtained from the middle division of the Inferior Oolite in the same district, and occurs also in the same formation in Normandy.

Turbo Sharpei. Plate IX, figs. 28, 28*a*.

T. Testâ conoideâ; anfractibus (4) *convexis, gradatim tumescentibus, suturis profundè impressis; anfractibus lineis elatis æqualibus, longitudinalibus et regularibus ornatis, aliis transversis decussatis; lineis transversis supernè distantibus, infernè approximatis; aperturâ ovatâ; umbilico nullo.*

Shell conoidal; whorls (4) convex, gradually increasing in size, their sutures deeply impressed; the surface of the whorls is ornamented with numerous equal and regular longitudinal lines, tranversely decussated by others of equal size; the transverse lines are arranged distantly upon the upper portions of the whorls, but more nearly upon the lower; aperture oval; no umbilicus.

Both descriptions of lines are scarcely discernible, except upon the last volution, where they are prominent; but the lower portion of this whorl is destitute of the longitudinal lines, which extend over only the upper half.

The general figure differs from *Turbo elaboratus* (Plate IX, fig. 27), in the more gradual increase of the whorls, which are likewise more convex, and have not the distinct sulcus or area upon their upper portions, nor the large elevated costæ; these distinctive features have been faithfully delineated by the artist. The longitudinal lines are equal in size to those which are transverse, forming a simple cross-barred surface.

Locality. It is rare; but has been found both at Bussage and Minchinhampton Common. This species is dedicated to D. Sharpe, Esq., F.R.S.

Turbo pygmæus. Plate IX, figs. 29, 29*a*.

T. Testâ parvâ, conicâ; apice obtuso; anfractibus (4—5) *planatis, costis longitudinalibus numerosis* (*circa* 16 *in ambitu*), *cum punctis interstitialibus ornatis; aperturâ depressâ.*

Shell small, conical, apex obtuse; whorls (4—5) flattened, ornamented with numerous longitudinal ribs (about 16 in a volution), the interstitial spaces being closely and deeply punctated; aperture depressed. The costæ are large and equal; their continuity is interrupted by a narrow, encircling band at the base of each whorl; the height of the entire shell is somewhat greater than its transverse diameter at the base; the exact character of the mouth not being exposed, it is placed only provisionally in the genus *Turbo*.

Locality. Minchinhampton Common, at which place it would seem to be rare.

Turbo capitaneus, *Goldf.* Plate IX, figs. 33, 33*a*.

Turbo capitaneus, *Goldfuss.* 1842. Petref., iii, p. 97, t. 194, fig. 1.
— — *Bronn.* 1848. Index Palæont., p. 1318.

T. Testá turbinato-conicá, acutá, lineatá; basi granulatá cingulatá; anfractibus (6) *subteretibus bicarinatis, carinis granulis erectis coronatis; interstitiis canaliculatis.*

Shell turbinated or conical; apex acute, the base with a granular band encircling it; the whorls (6) are turreted, and have two encircling carinæ, the carinæ are elevated and fringed with closely-arranged granules, the interstitial spaces are canaliculated.

Locality. This elegant species occurs rarely in the planking of Minchinhampton Common; it is usually crushed or otherwise imperfect; it occurs likewise in the Inferior Oolite of Gloucestershire more frequently, and is usually better preserved.

We have ventured to assign this shell to the species described by Goldfuss, although its state of preservation does not show the longitudinal markings characteristic of that species.

TURBO OBTUSUS, *Sow.* Plate XI, figs. 9, 9*a*.

TURBO OBTUSUS, *Sow.* 1827. Min. Con., t. 551, fig. 2.
— — *Brown.* 1849. Illust. Foss. Conch., p. 73, t. 38, figs. 41, 42.
TURBO SUBOBTUSUS, *D'Orb.* 1850. Prod. Paléont., p. 300.

T. Testá parvá, conicá; spirá obtusa; anfractibus (4) *planatis, ultimo supernè subconcavo, infernè convexo, striis crebris, subundatis, transversis cincto; aperturá ovatá; umbilico nullo.*

Shell small, conical; spire obtuse; whorls 4, their sides flattened, the last whorl slightly concave in the upper and convex in its lower part; the whorls are encircled with striæ, closely arranged and slightly undulated; aperture ovate; no umbilicus.

In this minute species, the junctions of the whorls are strongly marked; the striæ are slightly punctated, giving to the spaces between them a rough or scabrous aspect; the striæ, however, are but faintly impressed, and are scarcely visible upon some specimens; the substance of the shell is thick, its axial slightly exceeding its transverse diameter, or being equal to about 2 lines.

Locality. Minchinhampton Common and Bussage. At both places it is somewhat rare, but occurs in more than one shelly bed. Ancliff, Wiltshire.

TURBO GOMONDEI. Plate XI, fig. 5.

T. Testá conoideá, spirá elatá, acutá; anfractibus (5) *planatis et costatis; costis transversis* (4) *densè nodulosis; aperturá ovatá, subdepressá, umbilico nullo.*

Shell conoidal, spire elevated, acute; whorls (5) flattened and costated; the costæ (4 in number) are transversal, and densely nodulated; the aperture is ovate and somewhat depressed; and there is no umbilicus.

The length of the aperture is scarcely equal to half the entire length of the shell, and somewhat exceeds its transverse diameter; it is moderately large, and wide at the base; the junctions of the whorls are strongly marked; the encircling costæ are large, closely arranged, and very densely nodulated. Axis 8 lines, transverse diameter of the last volution 6 lines.

Locality. Minchinhampton Common, where it occurs in the coarse planking: it is moderately rare.

We have dedicated this species to H. Gomonde, Esq., of Cheltenham, who has kindly allowed us the use of his collection of oolitic fossils.

MONODONTA, *Lamarck*. 1801.

Shell turbinated, aperture entire, base of the columella forming a tooth, with an exposed umbilicus half surrounding it; beneath the tooth is a longitudinal groove, the edges of which are acute; the outer lip is thick, striated within.

MONODONTA LYELLII, *Archiac*. Plate XI, figs. 4, 4*a*, *b*.

MONODONTA LYELLII, *Archiac*. 1843. Mém. Géol. Soc. France, tom. v, t. 29, fig. 8.
— — *Bronn*. 1848. Index Palæont., p. 742.
TURBO LYELLII, *D'Orb*. 1850. Prod. Paléont., p. 301.

M. Testâ turbinatâ, spirâ acutâ, anfractibus (4) *convexis, tricinctis; cingillis elatis et nodulosis; nodulis approximatis, antrorsum concavis; anfractu ultimo ventricoso, cingillis* 7 *ornato, ultimo cingillo maximo et profundè crenulato; umbilico magno.*

Shell turbinated; spire elevated, acute; whorls (4) convex, encircled with three carinæ; carinæ elevated and nodular; nodules placed close together, and concave on their anterior sides; the last whorl ventricose; encircling bands 7, the last being the largest and is deeply crenulated; the umbilicus is large.

The markings vary considerably in this species. In some specimens the encircling costæ are nearly smooth, in others they are merely notched; but the greater number are distinctly nodulated; the junctions of the whorls are deeply impressed; and the entire shell is very thick.

Locality. This shell is abundant in the shelly beds near Minchinhampton; the size varies from a diameter of 1 line to 5 lines. In the Great Oolite, Eparcy (*Aisne*), France.

MONODONTA IMBRICATA. Plate XI, figs. 3, 3*a*.

M. Testâ parvâ, conicâ; spirâ acuminatâ; anfractibus subplanis; striis imbricatis, transversis (4) *cinctis; anfractu ultimo ad basin subangulato.*

Shell small, conical; spire acuminated; whorls rather flattened, and encircled with four imbricated striæ; the last whorl is somewhat angulated towards its base.

The imbricated striæ are fine and closely arranged, those beneath the angle upon the last whorl are larger; the aperture is semilunar and contracted. As compared with *M. decussata*, this shell is more lengthened, the apex pointed, and the encircling striæ much fewer.

Locality. It is rare, and occurs, with the species before mentioned, at Minchinhampton.

MONODONTA FORMOSA. Plate XI, figs. 6, 6*a*, *b*.

M. Testâ turbinatâ, spirâ subdepressâ, prominulâ, obtusâ; anfractu ultimo in medio carinato, striis transversis crebris tenuissimis cincto; carinâ lævigatâ, rotundatâ, obtusâ, striis supra carinam positis magis elatis; aperturâ semilunari subcontractâ.

Shell turbinated, spire rather depressed, small, obtuse; the last whorl carinated in its middle part; the carina smooth, rounded, and obtuse; the last whorl has likewise transverse, closely arranged, fine, and crenulated striæ, those above the mesial carina being larger than the others; aperture semilunar, somewhat contracted.

In the greater number of specimens, more especially those of large dimensions, the encircling striæ are obsolete, the only markings being the lines of growth. Diameter of largest specimens, 4½ lines.

Locality. It is abundant and common to all the shelly beds near Minchinhampton.

MONODONTA DECUSSATA. Plate XI, figs. 9, 9*a*.

M. Testâ parvâ, conicâ; apice obtuso; anfractibus planis, suturis impressis; striis crebris transversis et longitudinalibus decussatis.

Shell small, conical; apex obtuse; whorls flattened, their sutures impressed, encircled with numerous transverse striæ, decussated and impressed by others longitudinally.

This shell is more obtuse than *M. imbricata;* the last whorl is more cylindrical than the others; the lines upon its surface are so delicate as to be scarcely visible, unless under a magnifier.

Locality. It is rare, and occurs with *M. imbricata*, in the soft shelly Oolite of Minchinhampton Common.

MONODONTA LABADYEI, *Archiac*, sp. Plate XI, fig. 2; *var.* fig. 11, 11*a*.

TROCHUS LABADYEI, *Archiac.* 1843. Mém. Soc. Géol. de France, iii, p. 379, t. 29, figs. 2, 2*a*.
TURBO — *D'Orb.* 1850. Prod. Paléont., p. 301.
? MONODONTA LÆVIGATA, *Goldfuss.* Petref., p. 101, t. 195, fig. 5.
? TURBO DESLONGCHAMPSI, *Desh.* Elem. de Conchyl., t. 68, figs. 17, 18.

M. Testâ turbinato-conicâ, lævi; spirâ elatâ, obtusâ; anfractibus planis seu subconvexis; suturis vix impressis; anfrâctu ultimo permagno; aperturâ ovatâ; umbilico nullo. Ætate adultâ testâ elatiore.

Shell turbinated, conical, oblique, smooth; spire elevated, obtuse; whorls flattened, or slightly convex, the sutures rather indistinct; the last whorl very large; the aperture ovate, and the base without umbilicus or sulcus.

The young shells are rather discoidal, but with increase of growth gradually become obliquely conical, so much so, that the two extremes of the figure would scarcely be taken for the same species.

Locality. It is abundant in all the shelly beds of the Great Oolite formation near Minchinhampton. Eparcy, France.

SOLARIUM, *Lam.* 1801.

OMALAXIS. BIFRONTIA, *Deshayes.*

Shell depressed, conical, or discoidal; base concave, or widely umbilicated, the spiral margin of which is angulated and crenulated; aperture trapezoidal, with a thin peritreme.

SOLARIUM POLYGONIUM, *Archiac.* Plate IX, figs. 24, 24*a*, *b*.

SOLARIUM POLYGONIUM, *Archiac.* 1843. Mém. Soc. Géol. de France, tom. v, p. 378, pl. 29, fig. 1.
— — *Bronn.* 1848. Index Palæont., p. 1152.
— — *D'Orb.* 1850. Prod. Paléont., p. 300.

S. Testâ discoideâ, spirâ parvâ, anfractibus (4) *planis, ultimo carinato; angulis* (9) *costatis; costis elatioribus; lineis transversis et longitudinalibus decussatis; carinâ parvâ, nodulosâ propè suturam sitâ.*

Shell discoidal, spire small, whorls (4) flattened, the last whorl carinated and angulated; angles (9) costated; costæ elevated; there are also encircling lines decussated by others which are longitudinal, and a small, closely nodulated carina, surrounding the upper portion of the whorls, near to the suture; the first two volutions are smooth, rounded, elevated, but minute.

Locality. This species occurs in the vicinity of Minchinhampton more frequently than any other of the genus, but, owing to its thinness and delicacy, few examples are well preserved. The white stone of Bussage is the most favorable position for obtaining it.

Great Oolite, Eparcy, France (*D'Archiac*).

SOLARIUM VARICOSUM. Plate IX, figs. 23, 23*a*, *b*.

S. Testâ conico-depressâ; anfractibus (4) *angulatis, lineis crebris transversis et longi-*

tudinalibus decussantibus et varicibus irregularibus angulatis, ornatis; umbilico contracto, basi latâ, tenuissimè cancellato.

Shell conical, depressed; whorls (4) angulated, and encircled with closely-arranged lines, longitudinally crossed by others, and equally densely arranged; varices elevated, longitudinal, angulated in their middle part, and placed at irregular distances; the umbilicus is contracted; the base is wide, slightly convex, and has a finely-cancellated surface.

Locality. It occurs in the planking of Minchinhampton Common, very rarely.

Solarium disculum. Plate IX, figs. 25, 25*a*, *b*.

S. Testâ parvâ, supernè discoideâ, infernè concavâ, lateribus angustatis, planis; spirâ vix elatâ; anfractibus 3, *marginibus angulatis et nodulosis, nodulis crebris, depressis; umbilico magno, margine noduloso.*

Shell small, discoidal above, concave beneath, the sides narrow and flattened; the spire, scarcely elevated, consists of 3 whorls, their margins angulated and nodulated, the nodules closely arranged and depressed; the umbilicus is large and deep, its margin is nodulated; the flattened sides of the last whorl are finely striated transversely.

The extreme flatness of the upper surface, the generally depressed form, and angular outer margin, distinguish it from contemporaneous species.

Locality. It is rare, and occurs in the planking at Minchinhampton, and in the white stone of Bussage and Eastcombs.

Delphinula, *Lam.*

Shell turbinated, thick, rugose; whorls few, convex or angular; aperture orbicular, entire; peritreme continuous, thickened; umbilicus conspicuous and denticulated.

Delphinula coronata, *Sow.* sp. Plate IX, fig. 26.

Euomphalus coronatus, *Sow.* 1824. Min. Con., t. 450, fig. 3.
— — *Brown.* Illust. Foss. Conch., p. 82, t. 43, figs. 20—22.
Delphinula coronata, *Flem.* 1827. Brit. Anim., p. 312.
— — *Bronn.* 1848. Index Palæont., p. 406.
? Delphinula stellata, *Buvignier.* Mém. Soc. Philom. Verdun, 2. pl. 5. figs. 35, 36.
Solarium coronatum, *D'Orb.* Prod. Paléont., p. 300.

D. Testâ discoideâ, parvâ, supernè planâ, angulatâ et spinigerâ; spinis latis, acutis et prominentibus; basi concavâ.

Shell discoidal above, flattened, angular, and spined; spines broad, pointed, placed at the angle of the last volution; base concave.

Locality. This little species is very rare. It occurs in the planking of Minchinhampton Common.

The specimen figured in the 'Min. Con.' is from the Oolite of Ancliff, Wiltshire; M. Buvignier describes his species as occurring in the Coral Rag of St. Mihiel, France.

DELPHINULA BUCKMANNI. Plate V, fig. 8.

D. Testâ turbinatâ, spirâ elatâ, anfractibus (3—4) *costatis; ultimo anfractu ventricoso, subquadrato, in medio costato; costis longitudinalibus, numerosis, rectis, et rotundatis, supernè acutis, striis transversis impressis; umbilico contracto, striis tenuissimis cincto.*

Shell turbinated, spire elevated, whorls (3—4) costated, the last whorl ventricose, subquadrate, costated in its middle portion; the costæ are longitudinal, numerous, perpendicular, acute at their upper extremities, and impressed with transverse striæ; the umbilicus is contracted, and encircled with very fine striæ.

The costæ are scarcely visible upon the upper surface of the last whorl, and nearly disappear towards its base; the aperture is suborbicular, the lips being less incrassated than is sometimes seen in this genus. Individual specimens vary very much in the elevation of the spire, and in the degree of squareness or angularity which the last whorl acquires; in some the umbilicus is scarcely visible, which usually happens in the more elevated shells.

Locality. This shell occurs in the beds of coarse planking on Minchinhampton Common; but well-preserved examples are rare.

DELPHINULA ALTA. Plate IX, fig. 31.

D. Testâ turbinatâ; spirâ elatâ, obtusâ; anfractibus angulatis (*internè rotundatis*); *anfractu ultimo tuberculis acutis, crebris sed distinctis ornato; basi quadricinctâ, costulis tuberculatis; umbilico magno profundo; aperturâ subquadratâ.*

Shell turbinated; spire elevated, obtuse; whorls angular (the moulds of the interior being convex); the last whorl has, surrounding its upper part, a circle of elevated, acute, distinct, and closely-arranged tubercles; the base is encircled with four elevated ribs, which are closely tuberculated; the upper or flatter part of the last whorl has several fine encircling lines (often indistinct); the umbilicus is large and deep, the aperture subquadrate and rather small.

Locality. Minchinhampton. This pretty shell occurs in the planking, and is not uncommon; but the coarseness of the deposit is unfavorable to the preservation of its more delicate features. Our best specimens may therefore be regarded as some of the choicer productions of the formation.

Sub-genus, CROSSOSTOMA.

C. Testá crassá, turbinatá, lævi, subdepressá; anfractibus subplanis, paucis; apice obtuso; aperturá subrotundá, integrá; columellá dentem obtusam formante; labio externo lævi, umbilico nullo. In ætate senici aperturá contractá crassá, orbiculari, lamíná testaceá flabelliformi cinctá.

Shell thick, turbinated, smooth, somewhat depressed or Rotelliform; whorls more or less flattened, few; apex of the spire obtuse, depressed; aperture nearly circular, entire; the columella forms at its base a simple prominent obtuse tooth; the outer lip is smooth; there is no umbilicus. In the oldest state of growth, the aperture becomes contracted by the deposition of shelly matter; it is perfectly orbicular, the circumference very thick, and is encircled with a thin frilled appendage, always irregular, and more or less produced.

In this genus the aperture undergoes a remarkable change as it approaches the last state of growth. The surface is very smooth, the figure Rotelliform, and the aperture is that of a smooth depressed *Monodonta;* and this is the usual condition in which the several species occur. Finally, however, a few thick lines of growth closely follow each other; the columella is concealed by a deposition of shelly matter; the aperture becomes precisely that of a *Delphinula,* and is surrounded by an additional shelly irregular lamina, which projects from it in every direction.[1]

CROSSOSTOMA PRATTII. Plate XI, figs. 21, 21*a*.

C. Testá parvá discoideá lævi; spirá subplaná, vix elatá; lineis incrementi rugis propè aperturam sitis; aperturá parvá, orbiculatá, labris incrassatis, lamíná testaceá abnorme cincto.

Shell small, discoidal; spire nearly flat, or but slightly elevated; the last volution has some rugose lines of growth situated near to the aperture; aperture small, orbicular; the lips incrassated, and encircled with an irregular shelly lamina.

The shelly encircling lamina is produced by an irregular expansion of the ultimate fold of growth; the few rugose plicæ have the more remarkable aspect, as the whole of the shell, excepting within the brief space of two lines from the aperture, is perfectly smooth.

Locality. Inferior Oolite near Bath.

We are indebted to S. P. Pratt, Esq., F.R.S., for the original specimens obtained from that locality.

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[1] M. A. D'Orbigny has described a species belonging to this sub-genus, under the name *Delphinula reflexilabrum,* from the Lias of Fontaine-Etoupefour: "Shell smooth, resembling a *Turbo,* but having a reflected, sharp, lamellar peristome surrounding the mouth."—*Prod. Paléont.*, p. 229.

CROSSOSTOMA? DISCOIDEUM. Plate XI, figs. 7, 7*a*, 7*b*.

C. Testâ lævi, depressâ; spirâ prominulâ; anfractibus angustatis, suturis impressis; aperturâ parvâ, suborbiculari.

Shell smooth, depressed; spire but little elevated, or nearly flat; whorls narrow, the sutures distinct; aperture small, basal nearly round. The height is equal to half the basal diameter.

This is, probably, only a variety of *C. Prattii,* and in a state in which all our Great Oolite specimens occur—the outer lip not being quite entire, and extremely thin and slightly rugged, never perfecting a well-defined lip (*C. discoideum*); the change to the ultimate condition occupies a space which does not exceed one fourth of a volution, a few rugged lines of growth are formed; an irregular lamina next protrudes, forming a kind of frill around a contracted, thickened, and orbicular aperture, as in *C. Prattii.*

Locality. Minchinhampton Common and Bussage, at which places it occurs somewhat rarely, and in more than one of the shelly beds.

CROSSOSTOMA? HELICIFORME. Plate XI, fig. 8.

C. Testâ lævi, turbinatâ, subdepressâ; spirâ parvâ prominulâ; anfractibus convexiusculis; aperturâ ellipticâ.

Shell smooth, turbinated, somewhat depressed; spire small, but little elevated; whorls rather convex; aperture elliptical.

Locality. It is somewhat rare; our specimens have been obtained from the planking of Minchinhampton Common; it is likewise found in the middle division of the Inferior Oolite at Leckhampton, near Cheltenham.

This species has the general form of *C. discoideum,* but the spire is more elevated; they are only provisionally referred to *Crossostoma,* having somewhat the aspect of *Monodonta,* and even (in *C. discoideum*), the thickened base of *Rotella.*

PHASIANELLA, *Lam.* 1812.

Shell oval, smooth; aperture oval, entire, forming an acute angle posteriorly at the junction of the columella and outer lip; outer lip thin; inner lip spread over a portion of the columella.

The Great Oolite shells provisionally referred to this genus are small, and like their recent congeners, individuals of the same species offer a considerable variety of form, which makes their determination rather difficult.

Phasianella elegans. Plate XI, figs. 27, 27*a*.

P. Testâ ovato-elongatâ; anfractibus (7) *convexiusculis; spirâ acutâ, aperturâ longiore.*

Shell ovately elongated, whorls (7) convex, the spire acute, larger than the aperture.

The height of the last volution is rather more than the remainder of the spire; the whorls are narrow and convex; the sutures strongly impressed. Axis 16 lines, transverse diameter 8 lines.

Locality. The planking of Minchinhampton Common has supplied this species in considerable numbers.

Phasianella Leymeriei, *Archiac.* Plate XI, figs. 31, 31*a*, 32.

Phasianella Leymeriei, *Archiac.* 1843. Mém. Soc. Géol. Fr., tom. v, t. 28, fig. 12.
— — *D'Orb.* 1850. Prod. Paléont., p. 301.
— — *Bronn.* Index Palæont., p. 956.

P. Testâ ovatâ, sub-globosâ; spirâ parvâ; anfractibus (6) *angustis, convexiusculis, anfractu ultimo amplo; aperturâ obliquâ magnâ.*

Shell ovate, subglobose; spire small; whorls (6) narrow, convex; the last whorl large; aperture oblique and large.

The length of the aperture is greater than that of the remainder of the spire, and the length of the last volution is twice as great as the spire. The variety of figure in this species is more than usually considerable. Axis 12 lines, transverse diameter 8 lines.

Locality. It is the most common of the Great Oolite *Phasianellæ*, and occurs in all the shelly beds near Minchinhampton.

Phasianella conica. Plate XI, figs. 30, 30*a*.

P. Testâ ovato-conicâ, acutâ; spirâ mediocriter elatâ, conicâ; anfractibus (6) *planis, ultimo elongato; aperturâ obliquâ angustâ.*

Shell ovately conical, acute; spire moderately elevated, conical; whorls (6) flattened; the last whorl elongated; aperture oblique and narrow.

This species is somewhat spindle-shaped, narrowing at both ends; the length of the aperture is less than that of the spire; but the last two volutions occupy more than two thirds of the entire length of the shell. Axis 10 lines, transverse diameter 4 lines.

Locality. It is not uncommon, and occurs in all the shelly beds, more especially at Minchinhampton Common.

Phasianella acutiuscula. Plate XI, figs. 28, 28*a*.

P. Testâ ovato-conicâ; spirâ elatâ, acutâ; anfractibus planis, angustis; anfractu ultimo ovato, magnitudine modico.

Shell ovately conical; spire elevated, acute; whorls flattened, narrow; the last whorl ovate, its size moderate.

The figure most nearly approaches to *P. conica,* but it is less gibbose; the spire is more acute, elevated; the whorls less numerous and narrow.

Locality. It is not uncommon, and is found in all the shelly beds near to Minchinhampton.

Phasianella nuciformis. Plate XI, fig. 26.

P. Testâ ovato-elongatâ; spirâ parvâ; anfractibus (6) *subplanis, ultimo elongato; aperturâ angustatâ.*

Shell ovately elongated; spire small; whorls (6) flattened, the last elongated; aperture narrow.

The length of the aperture is equal to that of the spire; the spire is acute; the volutions very narrow, except the last two turns, which are much elongated. Axis 9 lines, transverse diameter 5 lines.

Locality. It occurs in the planking of Minchinhampton Common, but is rare.

Phasianella parvula. Plate XI, figs. 29, 29*a*.

P. Testâ parvâ; spirâ elatâ, apice acuto; anfractibus (6—7) *planis aut subconvexis, angustis; anfractu ultimo subgloboso; aperturâ obliquâ; columellâ arcuatâ.*

Shell small; spire elevated; apex acute; whorls (6—7) flattened, or rather slightly convex and narrow; the last whorl globose and large; the aperture oblique and oval; the columella curved at its base.

The length of the aperture is two fifths of the entire shell; the whorls are more numerous, and the apex more acute, than is found in the other Great Oolite species; the aperture is rather small and contracted at its base. Axis 5 lines, transverse diameter 2½ lines. Rare.

Locality. Minchinhampton Common.

PHASIANELLA TUMIDULA. Plate XI, figs. 25, 25*a*.

P. Testâ turbinatâ, elongatâ; spirâ acutâ; anfractibus convexis (8), *suturis depressis; anfractu ultimo globoso; aperturâ magnâ ovato-rotundatâ.*

Shell turbinated, elongated; spire acute; whorls (8) convex, the sutures deeply depressed; the last whorl globose; the aperture large, ovately rounded.

This species has an elevated, acute spire, and convex whorls, and is remarkable for the sudden increase of the last two volutions, which are very ventricose. Neither of our specimens are quite perfect about the outer lip; but the distinctive character of the species is sufficiently evident. Axis 19 lines, transverse diameter 11 lines.

Locality. It occurs rarely in the planking at Minchinhampton Common.

Family—PLEUROTOMARIDÆ.

PLEUROTOMARIA, *Defrance.* 1825.

SCISSURELLA, *D'Orbigny.* 1823.

Shell turbinated or conical; aperture subquadrate, the angles rounded; outer lip thin and sharp, having a fissure or deep notch in the middle part, or near to the suture; an encircling band or rib round each whorl follows the fissure.

The *Pleurotomariæ* are rare in the Minchinhampton beds, and the larger specimens are usually broken. It will be observed, in the following descriptions, how very few examples of each species have been obtained, so that we are almost enabled to give their number with exactness. Placed amidst such a multitude and variety of molluscous relics, in spots teeming with life, it is not easy to account for their rarity and imperfect condition. Inferring that they were usually gregareous, we are led to suspect that the *littoral* condition of these shelly beds was not suited to their propagation, and that the larger imperfect specimens were denizens of greater depths, the shells occasionally being stranded among the more littoral Mollusks. As a remarkable instance of the recurrence of similar phenomena at a very distant locality, we would direct attention to the elaborate and valuable Memoir of M. Deslongchamps,[1] on the *Pleurotomariæ* of the secondary formations of Calvados, in which 53 species are mentioned as occurring in the Lias and the Lower and Middle Oolitic systems. It is stated that they are exceedingly abundant; but, on referring to the Great Oolite species, 11 in number, we find, with one exception only, a repetition of the following remarks appended to them: "One example; two examples; rare; very rare." In fact, when describing the species which we have identified in that Memoir, we seem, when stating their numbers, to be repeating the words of its author.

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[1] Mém. Soc. Linn. de Normandie, vol. viii.

PLEUROTOMARIA SCALARIS, *Desl.* Plate X, fig. 14.

PLEUROTOMARIA SCALARIS, *Deslongchamps.* 1848. Mém. Soc. Linn. de Normandie, vol. viii, p. 67, pl. 8, fig. 1.
Var. a, TURGIDULA, *Desl.,* ibid., p. 67.
— SCALARIS, *D'Orb.* 1850. Prod. Paléont., p. 269.

P. Testá crassá, trochiformi; spirá plus minusve exsertá; apice acuto; anfractibus carinatis, subgradatis aut gradatis, tranversè striatis, sinu magno profundo; fasciá sinûs prominente, lævi aut longitrorsum densissimè striatá, in medio anfractuum sitá; ultimo anfractu ad basim angulato, obtusiusculo; basi planá aut subconvexá; umbilico aut parvo, aut minimo, aut nullo; aperturá subquadratá, labro sinistro crassiori reflexo. (Deslongchamps.)

Shell thick, trochiform; spire more or less elevated; apex acute; whorls carinated, more or less step-like, transversely striated; sinus large and deep; band of the sinus prominent, smooth, or very finely striated longitudinally, and placed in the middle of the whorl; the last whorl is angulated, or somewhat obtuse at the lower margin; the base is flat, or slightly convex; the umbilicus small, very minute, or wanting altogether; the aperture subquadrate, the left lip being thick and turned outwards.

Altogether we have obtained eight or nine specimens. They vary in the elevation of the spire, and agree with the first variety of *P. scalaris* of M. Deslongchamps, viz. the *turgidula* which he thus characterises:

"*Testá conicá, anfractibus subrotundato angulatis, vix gradatis, transversim obsoletissimè striatis, striis in ultimo basis vicinis; basi subconvexá, striis radiatis incrementi tantum notatá, umbilico minimo.*"

Axis 29 lines, basal diameter 26 lines.

Locality. The planking of Minchinhampton Common has furnished all our specimens, only three of which are well preserved. Inferior Oolite, Bayeux. (*Desl.*)

PLEUROTOMARIA PAGODUS. Plate X, fig. 9. Var. DEPAUPERATA.

? PLEUROTOMARIA PAGODUS, *Deslongchamps.* 1848. Mém. Soc. Linn. de Normandie. vol. viii, pl. 14, fig. 4.
— — *D'Orb.* 1850. Prod. Paléont., p. 301.

P. Testá trochiformi, subturritá; apice acutiori; anfractibus gradatis, infra fasciam constrictis, transversim et tenuissimè striatis, in medio nodis coronatis ad suturam subundulatis; sinu magno, profundo; fasciá sinûs planá, densissimè longitrorsùm striatá, infra *nodos sitá; ultimo anfractu ad basim angulato subnodoso; basi subconcavá, concentricè striatá, striis tenuibus, profundis ad umbilicum minimum nullis; aperturá subpentagoná.*

Shell trochiform, subturreted; apex rather acute; whorls step-like, narrowed beneath the band, transversely and finely striated, coronated in the middle by a circle of nodules, subundulated even to the suture; the sinus is large and deep, the band of the sinus is flat, densely striated longitudinally, and situated beneath the nodules; the last whorl is angulated at lower margin and slightly nodulated; the base is somewhat concave, concentrically and very delicately striated; the umbilicus is very small or obsolete; the aperture is nearly pentagonal.

Locality. Two specimens only have been found in the Minchinhampton district. Both are small compared with the fine specimen figured by M. Deslongchamps, who is very fortunate in that respect, considering that the species is likewise very rare in Normandy. Its position is the soft shelly Oolite beneath the planking at Minchinhampton Common.

Pleurotomaria discoidea. Plate X, fig. 12.

P. Testá turbinato-depressá, spirá obtusá, anfractibus subconvexis, lævibus et angustatis; sinu angustissimo; fasciá sinus strictá, et planatá interdum vix notatá, infrá mediam anfractuum sitá; ultimo anfractu ad basim angulato convexo, basi subconvexá, lævi; umbilico minuto aut nullo, aperturá subquadratá.

Shell turbinated, depressed: spire obtuse; whorls somewhat convex, smooth, and narrow; sinus very narrow; the band of the sinus narrow, flattened, and smooth, sometimes scarcely distinguishable, and placed beneath the middle of the whorls; the last whorl is angulated, and convex at the margin; the base is slightly convex, and smooth; the umbilicus minute or wanting; the aperture subquadrate.

The small elevation of the spire, which is only equal to two fifths of the basal diameter, necessarily renders the whorls narrow; the basal angle of the last whorl is unusually acute; the sutures of the whorls are strongly marked.

Though possessing few distinctive characters, it is little liable to be confounded with others; the extreme smoothness, depressed form, and proximity of the sinus and fascia to the base of the whorls, are obvious and sufficient features. Height 4 lines, basal diameter 10 lines.

Locality. We can enumerate seven specimens; they occurred in the white stone at Bussage; also in the lower portion of the formation on the south side of Minchinhampton Common, where the rock is not very shelly.

Pleurotomaria obesa, *Desl.* Plate X, fig. 11.

Pleurotomaria obesa, *Deslongchamps.* 1848. Mém. Soc. Linn. de Normandie. vol. viii, p. 134, pl. 14, fig. 1.
— — *D'Orb.* 1850. Prod. Paléont., p. 302.

P. Testâ trochiformi, apice subacuto, anfractibus rotundatis, in medio subdepressis, transversè striatis; striis frequentibus obsoletis, æqualibus, sinu angustissimo, profundissimo, fasciâ sinûs strictissimâ, vix a striis distinctâ, longitrorsum tamen densissimè striatâ, in medio anfractuum sitâ, ultimo anfractu ad basim angulato-convexo; basi subconvexâ concentricè striatâ, striis rarioribus obsoletissimis, hinc et indè evanescentibus, umbilico magno, pervio (parietibus subplanis), ad marginem sulcato, sulco sat parvo, spiraliter ascendente, suturæ internæ vicino, sed ab ea distinctissimo; aperturâ subquadratâ. (Deslongchamps.)

Shell trochiform, apex subacute; whorls somewhat convex, slightly depressed in their middle, and transversely striated; the striæ, which are equal, are frequently obsolete; the sinus is narrow and deep, the band very narrow, so as scarcely to be distinguished from the striæ; but it is densely striated longitudinally, and situated in the middle of the whorls; the last whorl is convexly angulated at the lower margin; the base is somewhat convex, concentrically striated, the striæ being frequently scarcely distinguishable; the umbilicus is large, pervious (the sides nearly flat), sulcated at its margin, and ascends the interior spirally, near to the internal sutures, but distinct from them; the aperture is subquadrate.

Locality. We have only procured two specimens, which do not fully exhibit the minute features of this species, so carefully described by M. Deslongchamps. Both were obtained from the planking of Minchinhampton Common. Great Oolite, Ranville. (*Desl.*)

Pleurotomaria clathrata, *Goldf.* Plate X, figs. 6, 6*a*.

? Pleurotomaria clathrata, *Goldfuss.* 1843. Petref, p. 74, t. 186, fig. 8.
— — *D'Orb.* 1850. Prod. Paléont., p. 356.

P. Testâ trochiformi subdepressâ, apice acuto, anfractibus planis, (5,) *cingillis lineisque crebris clathratis; basi convexo-planâ tenuissimè clathrata; umbilico minimo aut nullo; anfractibus supernè obsoletè tuberculatis; fasciâ sinûs marginali.*

Shell trochiform, somewhat depressed; apex acute; whorls (5) flattened, their sutures well marked; covered with very fine, regular, equal lines, both longitudinal and transverse; the base is flattened or slightly convex, with a very fine cancellated surface; umbilicus minute or obsolete; the upper border of the whorls has an obscure encircling row of tubercles; fascia of the sinus marginal; the aperture quadrate.

The delicate markings upon the surface are only visible under a magnifier. The general figure and character of the surface nearly approximates to *Pleurotomaria punctulata,* Deslongchamps, but in that species the fascia of the sinus is placed upon the middle of the whorls, and it is destitute of the upper encircling band of tubercles.

Axis 4 lines, basal diameter 6 lines.

Locality. The white stone of Bussage has furnished our specimen, but the species is very rare.

PLEUROTOMARIA COMPOSITA. Plate X, figs. 13, 13*a*.

P. Testâ turbinatâ, conicâ; spirâ subacutâ; anfractibus supernè convexis, infra planatis vel subconcavis; sinu magno; fasciâ sinûs latâ, longitudinaliter striatâ, in medio anfractuum sitâ; anfractibus supra fasciam densissimè longitudinaliter et obliquè striatis; striis inæqualibus; infra fasciam striis transversis æqualibus profundis subdistantibus; anfractu ultimo ad basim rotundato; facie infimâ planâ, vel subconvexâ, longitudinaliter tenuissimè et inæqualiter undulatim striatâ; umbilico nullo? vel minima; aperturâ subpentagonali.

Shell turreted, conical; spire subacute; whorls convex in their upper portions, flattened or slightly concave in their lower; the sinus large, the band of the sinus wide, longitudinally striated, and situated in the middle of the whorls; the whorls above the band are, longitudinally, densely and obliquely striated; the striæ are unequal; beneath the band the whorls are transversely striated; the striæ are equal, deeply impressed, and rather distant; the last whorl is rounded at the lower margin; the base is flat or slightly convex, it is longitudinally, densely, and unequally striated; the striæ undulate; umbilicus none or minute; aperture subpentagonal. Axis 9 lines, basal diameter 11 lines.

Locality. The lower weatherstone beds at Quarrhouse and Minchinhampton have yielded several specimens.

TROCHOTOMA, *Lycett. Deslongchamps,* 1842.

RIMULUS, *D'Orb.* 1839.

DITREMARIA, *D'Orb.* 1842.

T. Testâ turbinatâ, conicâ; anfractibus sæpissimè angulatis, in medio vittâ strictâ notatis; periphæriâ subangulatâ; aperturâ subquadratâ; columellâ arcuatâ; basi excavatâ, *infundibuliformi, umbilicum simulante; fissurâ elongatâ, anticè clausâ, non longius ab ore, ultimum anfractum subdepressum perforante.* (Deslongchamps.)

Shell turbinated, conical; whorls usually angulated, having a band or rib encircling the middle of each whorl; periphery subangular; aperture basal, subquadrate; columella curved; base excavated, excavation large, and resembling an umbilicus; fissure transversely elongated, closed anteriorly, but not far from the outer lip, its length being about equal to the distance which separates it.

Our specimens exemplify the changes which the shell underwent during its advance of growth. The perfect aperture, and likewise certain oblique furrows, to be seen upon other parts of the shell, indicate so many stages of repose, each of which probably continued a considerable period; the amount of advance at each stage varied from one half to three fourths of a volution.

During the period of repose, the egress currents probably passed through the fissure; the edges of which are worthy of notice. The substance of the shell generally is thick, but the edges of the fissure are extremely thin, and exhibit that irregular, ragged, or imperfect outline which is seen in bone or shell during the process of growth or absorption. When, however, the animal was forming new shell in advance of the aperture, the fissure was not advanced forward with it, but the anal siphon remained in the same position until a considerable progress had been made in the formation of new shell. At length that organ was withdrawn, to be protruded from the aperture, and the formation of a new fissure immediately commenced. One specimen in our possession exhibits the fissure still open, although the formation of new shell had proceeded beyond the old aperture to the extent of one fourth of a volution. In this condition the outer lip is ragged and imperfect; and during the brief period of the formation of a new fissure, the aperture acquires exactly the aspect of a *Pleurotomaria;* and it is not uncommon to find specimens in this condition. The new shell is then very thin, and consequently is more or less crushed or imperfect. These several removals of the anal siphon, and formation of new fissures at distant intervals, are analogous to what is observed in *Haliotis,* except that in the latter genus several perforations remain open during the formation of a new one, and their borders are regular and smooth, not being destined to undergo the change which we observe in *Trochotoma.* It seems indeed not improbable, that in the young state, or until three volutions had been completed, that no fissure was formed, and that the siphon was protruded from the aperture. This idea is founded upon the fact that those volutions are always smooth, convex, and destitute of the encircling rib which subsequently follows the fissure. This character is best seen by contrast in such species as in advanced growth become very angular or step-like, as in *T. tabulata, T. discoidea,* and *T. extensa.* The reader is referred to the interresting observations on this genus, by M. E. Deslongchamps, 'Mém. Soc. Lin. Normandie,' vol. vii, pp. 99—104.

TROCHOTOMA ACUMINATA, *Desl.* Plate X, figs. 18*a*, 20.

TROCHOTOMA ACUMINATA, *Deslongchamps.* 1842. Mém. Soc. Linn. de Normandie, tom. vii, p. 108, pl. 8, figs. 11—15.
DITREMARIA ACUMINATA, *D'Orb.* 1850, Prod. Paléont., p. 301.

T. Testâ conicâ, spirâ plus minusve elatâ, lævi aut substriatâ; apice acuminato; anfractibus (7, 8) *ex apice ad aperturam magis â magis tumescentibus donec ultimus subquadratus fiat; infimâ facie dilatatâ, in medio cavum infunbibuliformem ferente, ad peripheriam concentricè striatâ.* (Deslongchamps.)

Shell conical, spire more or less elevated, smooth, or slightly striated; apex acute; whorls (7, 8) gradually increasing from the apex until the last whorl becomes subquadrate; the lower surface has a very deep but somewhat contracted cavity, which is concentrically striated.

This is the most elevated or conical of the Great Oolite species. The last volution is distinctly striated, the rib posterior to the aperture being very prominent; the height and basal diameter are about equal.

Locality. Great Oolite of Minchinhampton and Bussage; Langrune, France.

TROCHOTOMA CONULOIDES, *Desl.* Plate X, fig. 16.

TROCHOTOMA CONULOIDES, *Deslongchamps.* 1842. Mém. Soc. Linn. de Normandie, tom. vii, p. 109, pl. 8, figs. 16—19.
DITREMARIA — *D'Orb.* Prod. Paléont., p. 301.

T. Testâ conicâ, apice acuto; anfractibus (5, 6) *concentricè striatis, planis; ultimo anfractu vix ad fissuram dilatato; basi ad peripheriam convexiusculâ, striatâ, in medio profundè excavatâ.*

Shell regularly conical, apex acute; whorls (5, 6) concentrically striated, flattened; the lower surface convex, striated, and deeply excavated.

The volutions are narrow and flattened, the encircling rib narrow and elevated; the figure is very oblique, the basal diameter exceeds the height by one fourth.

Our figure is somewhat reduced.

Locality. Great Oolite of Minchinhampton and Bussage; Luc, Langrune, France.

Trochotoma tabulata. Plate X, figs. 17, 17*a*.

T. Testá conicá, apice acuto, anfractibus (5) *tenuissimè striatis subquadratis, medio angulatis; anfractu ultimo subangulato; basi planato, profundè excavatá.*

Shell conical, apex acute; whorls 5, very finely striated, step-like, and angulated in their middle portion; the last whorl is angulated, the base flattened and deeply excavated.

The sides of the volutions are nearly flat, both above and beneath the angle, which, together with the smallness of the encircling rib, fineness of the striæ, and acute apex, serves to distinguish it from *T. calix* or *T. affinis*, Desl., which is an Inferior Oolite species. It is moderately common. Height 10 lines, basal diameter 12 lines.

Our figure is of medium dimensions.

Locality. Great Oolite of Minchinhampton.

Trochotoma obtusa. Plate X, fig. 15*a*, *b*.

T. Testá turbinatá; apice obtuso; anfractibus (5) *convexiusculis, striatis, basi dilatatá, medio latè excavatá; periphæriá striata.*

Shell turbinated; apex obtuse; whorls (5) rather convex, striated, the lower surface dilated, its middle widely excavated, periphery striated.

The encircling rib is large but depressed, and contributes to give a convex aspect to the whorls; the striæ are large, the general figure being more turbinated, or less regularly conical than is usual with the *Trochotomæ*, each advance of growth was equal to two thirds of a volution: it is by far the most abundant of the genus. Height 10 lines, basal diameter 13 lines.

Locality. Great Oolite of Minchinhampton.

Trochotoma extensa. Plate X, figs. 19*a*, 19*b*.

T. Testá conicá; apice obtuso, depressá; anfractibus (4, 5) *subangulatis, planis, et lævibus; basi amplá, profundè excavatá.*

Shell conical; apex obtuse, depressed; whorls (4, 5) subangular, flattened, and smooth; base wide, rather convex; cavity large and deep.

This is by far the largest and most rare of the Great Oolite species, the base is enormously wide, and the cavity very large. Height 16 lines, basal diameter 30 lines.

Locality. Minchinhampton.

TROCHOTOMA DISCOIDEA, *Roëmer*, sp. Plate X, figs. 10, 10*a*, 10*b*, 10*c*.

? TROCHUS DISCOIDEUS, *Roëmer*. 1836. Nordd. Oolith., p. 150, t. 11, fig. 12.
— — *D'Orb.* 1850. Prod. Paléont,, p. 354.
— — *Bronn.* 1848. Index Palæont., p. 1300.

T. Testâ discoideâ, plano-convexâ, basi concavâ, lato-umbilicatâ; anfractibus (3) *depressis, subconvexis, transversim lineatis, basi acutis; aperturâ transversè depressâ, ovatâ.* (Roëmer.)

Shell discoidal, slightly convex, base concave, widely umbilicated; whorls (3) depressed, rather convex, transversely lineated, lines impressed by closely-arranged longitudinal and very fine oblique striæ; lines upon the base acute; aperture depressed and excavated.

We have never been able to discover an open fissure upon this small species, but the general figure agrees with this genus so well that we have not ventured to assign it to any other. Four lines are visible upon the lower and seven upon the upper face of the last volution, which is angular or step-like; the first two turns are smooth and rounded: rare. Height 3 lines, basal diameter 7½ lines.

Locality. Minchinhampton; Coral Rag, near Hildesheim (*Roëmer*).

STOMATIA, *Lam.* 1801.

STOMAX, *Montfort.* 1810.

Shell suborbicular or oblong, generally ear-shaped and depressed; in most species the spire is prominent, but not produced, nor elongated; sometimes, however, it is very small, marginal, and inconspicuous. Aperture mostly longitudinal; in some species nearly orbicular; in others much elongated; always very large; its edges entire, united, at the upper part, and scarcely modified or altered in form by any portion of the last volution. Volutions from two to four. (*G. B. Sowerby.*)

From the characters of the aperture and the presence of the carina, we have ventured to assign the following shell to the genus *Stomatia* (Lam.), from most of the recent species of which it differs in having a depressed spire, and the lines of growth and spiral striæ very regular, and sharply defined. Should other specimens afford further generic distinctions, we would suggest the name *Megastoma* for it.

STOMATIA ? (MEGASTOMA), *Buvignieri.* Plate IX, fig. 32, 32 *a.*

S. Testâ semiglobosâ; spirâ parvâ, depressâ; anfractu ultimo transversim costulato, et in medio carinato, carinâ acutâ, elatâ, costis longitudinalibus densis, lineis tenuissimis impressis notatis; aperturâ magnâ semilunari; labio externo fisso ?

Shell semiglobose; spire depressed; last whorl with a mesial, elevated, acute carina, crossed by longitudinal, narrow, elevated ribs—the ribs being impressed by fine encircling, transverse lines; aperture very large; outer lip slightly notched. The shell above the carina is flattened; the ribs, which are perfectly regular, pass over the carina, and beneath are decussated by fine transverse lines.

Locality. This rare shell, which attains the size of a small bean, has only been found in the soft oolite beneath the planking on Minchinhampton Common.

We have dedicated this species to M. Buvignier, who has figured and described some apparently congeneric forms under the name of *Stomatella carinata* and *S. funata.* (See 'Mém. Soc. Phil. Verdun,' 1843, p. 19, t. 5, f. 27—30.)

Family—FISSURELLIDÆ.

FISSURELLA, *Lam.* 1801.

FISSURELLUS, *Montfort,* 1810.

Shell conical, base entirely open, orbicular or oval; apex central or subcentral, having a foramen of an oval figure, central, or near to the anterior or shorter side; surface usually cancellated, or ornamented with ribs and lines; margin generally thickened; muscular impression nearly continuous.

FISSURELLA ACUTA, *Desl.* Plate VIII, fig. 5, 5*a*—*c*.

FISSURELLA ACUTA, *Deslongchamps,* 1842. Mém. Soc. Linn. de Normandie, tom. vii, pl. 7, figs. 22—24.
RIMULA — *D'Orb.* 1850. Prod. Paléont., p. 303.

F. Testâ conicâ, altâ; basi subcirculari; apice acuto, subcentrali; foramine subapiciali, anticè versato, supernè rotundato, infernè rimâ angustâ producto, striis longitudinalibus parvis crebris, aliis transversis testam decussantibus. (Deslong.)

Shell conical, elevated, nearly circular; apex acute, nearly central; foramen a little anterior to the apex, rounded above, narrow below; striæ longitudinal, small, closely-arranged, crossed by others, transverse and less prominent. Height 3 lines, base 3 lines.

Locality. This little conical shell ranks with the rarest productions of the Great Oolite; the white stone of Eastcombs and Bussage have furnished the only known English specimens: Langrune, France.

RIMULA, *Defrance*, 1827.

RIMULARIA, *Defrance.* 1827.
SIPHO, *Brown.* 1847.

Shell conical, base entirely open, oval; apex curved more or less posteriorly; surface near the anterior border with a fissure, or oval foramen, usually placed upon a prominent longitudinal rib; the fissure does not reach the margin.

RIMULA TRICARINATA, *Sow.*, sp. Plate VIII, fig. 2, 2*a*—*c*.

EMARGINULA TRICARINATA, *Sow.* 1826. Min. Con., t. 519, fig. 2.
— — *Brown.* 1847. Illust. Foss. Conch., p. 104, t. xlviii, figs. 14, 14*.
— — *Bronn.* 1848. Index Palæont., p. 457.
— — *D'Orb.* 1850. Prod. Paléont., p. 303.

R. Testâ parvâ, conicâ; apice posticè curvato, costis tribus magnis anticis, aliis minoribus posticis, lineis interstitialibus, transversis numerosis.

Shell small, conical; apex curved posteriorly, with three large diverging, anterior ribs; other smaller ribs occupy the sides and posterior part of the shell; the interstitial spaces have numerous tranverse lines.

In this species, as in the *R. Blotii,* the fissure is of a lengthened oval figure, and is cut out of the middle and more elevated rib. Having examined the original specimen figured in the Mineral Conchology, we are enabled to assign it to the present genus without hesitation; in two of the specimens on the same tablet, an imperfection at the anterior extremity of the mesial rib gave them somewhat the aspect of an *Emarginula,* and may have been the reason, probably, for assigning both this and *R. clathrata* with that genus.

Locality. Ancliff: two specimens have, likewise, been found at Minchinhampton.

RIMULA CLATHRATA, *Sow.*, sp. Plate VIII, fig. 1, 1*a*—*c*.

EMARGINULA CLATHRATA, *Sow.* 1826. Min. Con., t. 519, fig. 1.
? — GOLDFUSSII, *Roëmer.* 1836. Nordd. Oolith., t. 19, fig. 23.
? — — *Goldfuss.* 1845. Petref., t. 167, fig. 15.
SIPHO CLATHRATA, *Brown.* 1847. Illust. Foss. Conch., p. 103, t. 48, figs. 1, 2.
RIMULA — *Morris.* 1843. Catalogue of British Fossils, p. 160.
— — *Bronn.* 1848. Index Palæont., p. 1088.
— — *D'Orb.* 1849. Prod. Paléont., p. 303.

R. Testâ conicâ; apice posticè curvato; ambitu ovali; rimâ angustâ, costis majoribus radiantibus (*circa* 18), *minoribus tranversis decussatis.*

Shell conical; apex somewhat spiral, and curved posteriorly; base oval, foramen narrow, lengthened, and rather distant from the anterior margin; ribs radiating (about 18 in number), crossed by others, smaller and transverse.

The indifferent condition of the original specimen will account for its having been placed with *Emarginula.*

Locality. Ancliff and Minchinhampton; at the latter place it occurs only in the bed of planking: it is rare.

RIMULA BLOTII, *Desl.*, sp., Plate VIII, fig. 3, 3*a*, *b*, *c*.

EMARGINULA BLOTII, *Deslongchamps.* 1842. Mém. Soc. Linn. de Normandie, tom. vii, pl. 10, figs. 1—3.
— — *D'Orb.* 1850. Prod. Paléont., p. 303.

R. Testâ parvâ, crassâ, conicâ; apice posticè curvato, lateribus subplanis; costis radiantibus magnis 15 *et parvis* 14 *alternis; sulcis punctis tranversalibus magnis notatis.*

Shell small, thick, conical; apex curved posteriorly, the sides flattened; ribs radiating, 15 larger and 14 smaller, alternating—the three larger anterior ones being the most prominent; the transverse sulci of the interstitial spaces are large.

This species bears a considerable resemblance to *R. tricarinata;* but it is more compressed laterally, the three large anterior costæ are less divergent, and the form of the base is a longer oval. The *R. tricarinata* is likewise destitute of the smaller ribs, and has more numerous transverse lines.

Locality. It occurs rarely at Ancliff; and is likewise scarce in the shelly roestone of the Inferior Oolite at Leckhampton Hill, Cheltenham. A single specimen, badly preserved, has also been procured at Minchinhampton. Colleville, Calvados.

EMARGINULA, *Lam.*, 1801.

PATELLA sp., *Linn.*
EMARGINULUS, *Montf.* 1810.

Shell conical; apex usually curved posteriorly, base entirely open, orbicular or oval; its anterior margin having a vertical fissure more or less lengthened; surface ornamented with ribs, and decussated.

EMARGINULA SCALARIS, *Sow.* Plate VIII, figs. 4, 4*a*, *b*, *c*.

	EMARGINULA SCALARIS,	*Sow.* 1826.	Min. Con., t. 519, figs. 3, 4.
	— —	*Brown.* 1847.	Illust. Foss. Conch., p. 103, t. xlviii, fig. 5.
	— —	*Bronn.* 1848.	Index Palæont., p. 456.
	— —	*D'Orb.* 1850.	Prod. Paléont., p. 303.
?	— —	*Desl.* 1842.	Mém. Soc. Lin. Norm. vii. p. 125.

E. Testâ parvâ, conicâ; ambitu suborbiculari; apice plus minusve postico; costis lævibus radiantibus et transversis decussantibus; rimâ elongatâ latâ.

Shell small, conical; base nearly circular; apex elevated, more or less posterior; ribs radiating, smooth, transversely crossed by others. The radiating ribs are narrow, but are somewhat larger than those which are transverse; the mesial radiating rib bifurcates near the margin, forming a lengthened and wide fissure.

Locality. Ancliff and Minchinhampton; at the latter place it is very rare: Langrune, France.

Family—PATELLIDÆ.

PATELLA, *Linnæus.* 1758.

PATELLARIA, *Lhwyd.* Lith. Brit. Ich.
HELCION, *D'Orbigny.*

Shell ovately conical, with an oblong or oval base; apex subcentral, or inclining towards the anterior side; internal surface smooth; muscular impression horse-shoe shaped; margin of the aperture entire.

PATELLA CINGULATA, *Goldf.* Plate XII, figs. 4, 4*a*—*d*.

PATELLA CINGULATA,	*Goldfuss.* 1843.	Petref., t. 177, fig. 11.
HELCION —	*D'Orb.* 1850.	Prod. Paléont., p. 358.

P. Testâ conicâ, ambitu ovali, verticè subacuto, elato, erecto, antemediano; striis concentricis confertis irregularibus.

Shell conical, base oval, apex subacute, elevated, erect, placed anterior to the middle line of the shell, with encircling, irregular, closely-arranged striæ.

This may be regarded as one of the most abundant and characteristic of the *Patellæ* of the Great Ooolite. It occurs in all the shelly beds, but more especially in the white stone of Eastcombs and Bussage, near Brimscombe. The dimensions vary from the size of a duck-shot to a diameter of seven lines; and, from the great thickness of the shell, it is usually well preserved. The height is equal to two thirds of the longer basal diameter.

PATELLA RUGOSA, *Sow.* Plate XII, figs. 1, 1*a—g*.

PATELLARIA SIMA, *Lhwyd.* 1760. Lith. Brit. Ich., t. 8, No. 436.[1]
THE PATELLITE, *Park.* 1811. Org. Rem., vol. iii, p. 50, t. 5, fig. 21.
PATELLA RUGOSA, *Sow.* 1816. Min. Con., t. 139, fig. 6.
— — *Fleming.* 1827. Brit. Anim., p. 288.
— — *Brown.* 1849. Illust. Foss. Conch., p. 104, t. xlviii, fig. 18.
— — *Morris.* 1843. Cat. Brit. Foss., p. 155.
— ANCYLOIDES, *Sow.* 1824. Min. Con., t. 484, fig. 2.
— — *Brown.* Illust. Foss. Conch., p. 105, t. xlviii, figs. 27—29.
? — TESSONII, *Deslongchamps.* Mém. Soc. Linn. de Normandie, vol. vii, t. 7, fig. 3.
HELCION RUGOSA, *D'Orb.* Prod. Paléont., p. 303.

P. Testâ ovatâ, posticè convexâ, anticè subconcavâ, apice depresso, versùs marginem anticum inflexo; costulis radiantibus crebris, interstitiis lineatis; striis alteris transversis decussantibus, anticè congestis, testamque corrugantibus, posticè remotis.

Shell ovate, posterior side convex, anterior rather concave; apex depressed, inclined towards the anterior margin; the longitudinal radiating ribs are closely arranged, with fine lines between them, and decussated by encircling striæ, which, upon the anterior side, are corrugated or compressed closely together; posteriorly they are remote.

The aspect of this shell varies considerably, even in specimens obtained from the same quarry; and these differences are irrespective of those produced by the various stages of growth. Some approach to the circular form, and in such the apex is more central, elevated, and less curved forwards; others, which are a longer oval, have the summit more beak-like and depressed. The different degrees of magnitude in the radiating costæ, and the depth to which they are impressed by the encircling striæ, likewise contribute to the varieties of aspect. The greater number of specimens obtained from the quarries at Minchinhampton Common have a rugose aspect, but those from the quarries situated to the north of the vale of Brimscombe are usually different; the shell becomes very thin, the form is more depressed, and the surface is nearly smooth, the ribs being faintly marked, and the encircling striæ scarcely discernible. When very young, and not exceeding 6 lines in length, the figure is more depressed, of a longer oval, nearly smooth, and the apex is turned, and even slightly twisted to the right side, constituting the *Patella ancyloides* of the 'Mineral Conchology.' It is rare to obtain the shell so small; and the Ancliff specimen, upon which the species was founded, is, in common with all the Great Oolite shells of that locality, extremely small, but the number of intermediate sizes obtained, leave no doubt of its identity. It occurs, indifferently, in all the shelly beds. Our largest specimen has a length of $2\frac{1}{2}$ inches, a width of $2\frac{1}{4}$ inches, and a height of 13 lines.

Locality. Minchinhampton Common; Bussage; Ancliff.

Found also in the Stonesfield slate (*Sowerby*); in the roestone of the Inferior Oolite at

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[1] "Patellaria sima, fusci coloris, cancellata major. E lapicidinâ Stunfeldiensi," p. 24.

Leckhampton Hill, near Cheltenham (*Buckman*); and in the Great Oolite of Langrune, Luc, Ranville, &c., Normandy (*Deslongchamps*).

The *Patella Tessonii* (E. Desl.), which is referred to this species with some doubt, was obtained from the Inferior Oolite of Moutiers-en-Cinglais by M. Tesson.

PATELLA PARADOXA. Plate XII, figs. 2, 2*a*, *b*.

P. Testâ suborbiculatâ, apice depresso, versùs marginem anticum inflexo, latere antico concavo, postico convexo; costis radiantibus, elatis, rotundatis, undulatis, transversim striatis, et distantibus, costis posticis 9 *magnis, lateralibus obscuris, anticis congestis et corrugatis.*

Shell suborbicular, apex depressed, turned towards the anterior margin; anterior side concave, posterior convex; ribs radiating, large, distant, elevated, rounded, undulated and impressed by transverse striæ; the posterior costæ, about 9 in number, are large, those upon the sides of the shell are depressed and obscure; the anterior ribs are congested and corrugated.

The general aspect of this singular shell reminds us of *Patella rugosa*, which it follows somewhat in its varieties of aspect. When young, the few posterior costæ are prominent, but the sides of the shell are smooth, and the general figure is more depressed and elongated; the costæ are much larger than in *P. rugosa*, more distant, and, in consequence, much fewer; and the entire shell has a wrinkled and very rugose aspect. The colours are usually more or less preserved.

Locality. This may be considered as the most rare of the Minchinhampton *Patellæ*. The few examples obtained have been found in the planking, or in the equivalent white stone of Eastcombs and Bussage. The young form, were it known only by a single specimen, would probably be regarded as a distinct species; the older specimens attain nearly the dimensions of a middle-sized *P. rugosa*.

PATELLA SULCATA, *Deslongchamps*. Plate XII, figs. 3, 3*a*, *b*.

PATELLA SULCATA, *Deslongchamps*. 1842. Mém. Soc. Linn. de Normandie, vol. vii, p. 115, t. 7, figs. 9—11.
HELCION — *D'Orb.* 1850. Prod. Paléont., p. 272.

P. Testâ subellipticâ, conico-depressâ; apice recto; costis elatioribus radiantibus, inæqualibus, squammato-rugosis, sulcis profundis interpositis, margine subcrenato.

Shell subelliptical, conical, but depressed; apex erect; ribs elevated, radiating, unequal, squamose or rugose, with deep interstitial spaces; margin somewhat crenated.

The costæ do not increase in size materially as they approach the margin, and the additional ribs which are added with increase of growth equal the others in size. This species possesses a general resemblance to *P. Aubentonensis,* but the ribs are much more elevated, closely arranged, and rugose. The figure given by M. Deslongchamps is more elevated, but possesses no other essential distinctive character. Length 9 lines, breadth 7 lines, height 3 lines.

Locality. Rare, in the planking of Minchinhampton Common; also found in the Inferior Oolite of Port-en-Bessin (*Deslongchamps*).

PATELLA STRIATULA. Plate XII, figs. 5, 5*a, b.*

P. Testâ parvâ, conicâ, obtusâ; ambitu ovali; costis radiantibus, tenuioribus, crebris, flexuosis et nodulosis; lineis incrementi irregularibus.

Shell small, conical; apex obtuse; base oval; with ribs radiating, fine, closely arranged, waved, and nodulated; lines of growth irregular.

This species is more elevated than *P. Aubentonensis,* and the apex more obtuse; the costæ are likewise finer and more closely arranged.

Locality. In the soft shelly Oolite beneath the planking at Minchinhampton, where it is rare.

PATELLA ROEMERI. Plate XII, figs. 6, 6*a, b.*

P. Testâ ellipticâ, depressâ; apice subcentrali; costis (30) *radiantibus elatis; lineis interstitialibus numerosis; striis transversis impressis; lineis incrementi irregularibus paucis.*

Shell depressed, elliptical; apex subcentral, with 30 radiating and elevated ribs; interstitial lines numerous, the whole being crossed and impressed by striæ; lines of growth irregular and few.

This elegant little species is sometimes nearly discoidal, the central portion being most frequently denuded of costæ; the form is more nearly circular than *P. Aubentonensis,* and more depressed; the costæ are more elevated and less rounded, the interstitial spaces being much deeper. The longer diameter rarely exceeds 9 lines, the elevation being about 2.

Locality. It is moderately rare, but not confined to any one shelly bed, in the vicinity of Minchinhampton.

PATELLA AUBENTONENSIS, *Archiac.* Plate XII, figs. 7, 7*a, b, c, d.*

PATELLA AUBENTONENSIS, *Archiac.* 1843. Mém. Soc. Géol. de France, vol. v, p. 377, t. 28, fig. 8.
HELCION — *D'Orb.* 1850. Prod. Paleont., p. 304.

P. Testâ conicâ, depressâ; ambitu ovali; apice acuto, antemediano; costulis radiantibus inæqualibus irregularibus, flexuosis; striis transversis tenuissimis, irregularibus.

Shell conical, depressed; base oval; apex acute, placed anterior to the middle of the shell; ribs radiating, unequal, irregular and waved; striæ transverse, irregular, and very fine.

The radiating ribs are sometimes only visible towards the margin; the lines of growth are few and uncertain; as in the other *Patellæ*, the degree of elevation varies considerably, the apex approaching more nearly to the anterior border in such as are depressed; the colours are sometimes partially preserved.

Locality. It is not uncommon, and occurs in all the shelly beds of the Great Oolite near Minchinhampton. Our largest specimen is 1½ inches in its longer diameter.

M. D'Archiac describes this species as occurring in the Great Oolite of Aubenton, France, where it is rare.

PATELLA SUPRAJURENSIS, *Buv.* Plate XII, figs. 9, 9*a*.

? PATELLA SUPRAJURENSIS, *Buvignier*. 1843. Mém. Soc. Philom. de Verdun (Meuse), pl. 5, fig. 10.

P. Testâ ovato-depressâ; apice subcentrali; ambitu ovali; striis incrementi irregularibus, distinctis; striis concentricis tenuissimis crebris.

Shell ovate, depressed; apex subcentral; base oval; lines of growth irregular, strongly marked; concentric striæ closely arranged and very fine.

The absence of radiating costæ sufficiently separates this from *P. Aubentonensis*, the general figure of which it nearly resembles; the lines of growth are likewise much more strongly marked.

Locality. It is comparatively rare, and is not confined to any of the shelly beds of the Oolite at Minchinhampton. Found also in the Portland limestone of Varennes. (*Buv*).

PATELLA ARACHNOIDEA. Plate XII, figs. 8, 8*a, b*.

P. Testâ parvâ, ellipticâ et conicâ; apice acuto centrali; costulis longitudinalibus minutis et distantibus; lineis transversis numerosis, elatis et irregularibus.

Shell small, elliptical and conical; apex acute, central; with longitudinal, minute, and distant ribs; transverse lines very numerous, elevated, and irregular.

This small species has an elevated, acute apex, and displays under the magnifier a beautiful net-work kind of surface; the encircling lines are three or four times more dense than the longitudinal elevations. The form is nearly that of *Pileolus plicatus*, but more acute, and the character of the surface is altogether different.

Locality. The shelly beds at Quarhouse, which correspond to the planking of Minchinhampton Common, have furnished our specimens.

PATELLA INORNATA. Plate XII, figs. 11, 11*a*.

P. Testá elliptica, lævissimá, lateribus subcompressis; apice elato, erecto, subacuto, et postmediano; latere antico concavo, postico recto.

Shell elliptical, very smooth, the sides rather compressed; the apex erect, elevated; subacute, and situated posterior to the middle of the shell; anterior side concave, posterior straight.

The figure is a lengthened oval, the anterior side being rather depressed and produced; the concavity anterior to the apex, presents some resemblance to *P. nitida* (Deslongchamps); but in that shell the anterior side is much the shortest. *P. nitida* is, likewise, much more nearly orbicular and conical, the vertex being distinctly curved forwards. The smaller specimens have a more depressed figure, the anterior cavity being scarcely perceptible.

Longer diameter 10 lines, shorter diameter 8 lines, height 5 lines.

Locality. It occurs in all the shelly beds, but is not very common in the Minchinhampton district.

PATELLA NANA, *Sow.* Plate XII, figs. 10, 10*a*.

PATELLA NANA, *Sow.* 1824. Min. Con., t. 484, fig. 3.
— — *Fleming.* 1827. Brit. Anim., p. 288.
— — *Morris.* 1843. Cat. Brit. Foss., p. 155.
— — *Brown.* 1849. Illust. Foss. Conch., p. 105, t. xlviii, figs. 24—26.
HELCION NANA, *D'Orb.* 1850. Prod. Paléont., p. 303.

P. Testá parvá, ellipticá, conicá, lævissimá; apice submediano, erecto, obtuso.

Shell small, elliptical, conical, very smooth; apex nearly mesial, erect and obtuse.

The figure approaches near to *P. cingulata*, but it is usually a longer oval, and slightly compressed at the sides; in the young state the apex is more obtuse and depressed, the form being then a longer oval. Many of the larger specimens are scarcely to be distinguished from *P. cingulata*, except by the absence of encircling striæ; and in badly preserved specimens the striæ are nearly obsolete. *P. nana* may, therefore, possibly be only a variety of *P. cingulata;* they occur in the same beds, and are equally numerous. It is true that good specimens of each species are sufficiently distinct; but knowing the variations to which the shells of this genus are subject, we have thought proper to allude to the possible specific affinity. The size never equals that of the larger specimens of *P. cingulata.*

Locality. Minchinhampton Common: found also in the Oolite of Ancliff, near Bradford, Wilts.

DESLONGCHAMPSIA, *M'Coy*,[1] 1849.

D. Testá orbiculatá, conicá; apice subcentrali versus marginem anticum inflexo; costulis radiantibus, antico sulco lato longitudinali, in laminam appendiculatam producto.

Shell suborbicular, conical; apex acute, subcentral, curving slightly forwards; with a wide longitudinal anterior sulcus, produced into a rounded lobe.

This genus has been separated from the *Metoptoma* of Phillips, on account of the prolongation of the anterior excavated side into a rounded process, which it is presumed does not exist in that genus; the surface is highly ornamented, but the *Metoptomæ* are smooth. Two species are known, one of which is the *Patella appendiculata* of M. Deslongchamps (Mém. Soc. Linn. de Norm. vii, pl. XI, f. 1, 2); a somewhat oval shell, having simple, large radiating costæ, and the present species which has a cancellated surface. M. Deslongchamps remarks, that in all the patelloid shells, except the *Patellæ*, the apex is turned posteriorly, and if there exists any notch, furrow, or peculiar mark, it is always found on the anterior side, and never on the side to which the apex is curved. The situation of the furrow anteriorly, in the *P. appendiculata*, or on that side to which the apex of the shell is turned, as in the *Patellæ*, would indicate an important modification in the mantle, or some other organ of this mollusc.[2]

DESLONGCHAMPSIA EUGENEI, *M'Coy*. Plate XII, figs. 13, 13*a*.

D. Testá suborbiculatá, conicá; apice subcentrali, acuto, sulco antico lato striato; costulis numerosis, longitudinalibus, transversisque decussantibus; sulcis interstitialibus profundis.

Shell suborbicular, conical; apex subcentral, acute, anterior sulcus wide, striated; ribs elevated, numerous, transversely crossed by others of nearly equal size; and interstitial spaces deep.

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[1] Professor M'Coy having kindly forwarded his notes on this genus, intended for publication, we have, with his permission, inserted them:

"DESLONGCHAMPSIA, *M'Coy*.

"Shell convex, radiatingly ridged; apex eccentric towards the anterior end; a concave spoon-shaped hollow extends from the apex, gradually inclining to the outer margin, which it carries downwards into a small rounded lobe.

"This shell, like Phillips's genus *Metoptoma*, has a triangular hollow extending from the apex to the front margin, therein differing from *Patella*; the present genus differs from *Metoptoma* in its ridged surface, and from it and *Patella* in the front margin being produced downwards into a rounded lobe. This latter structure would prevent the firm adhesion of the shell! This group has been recognised by M. E. Deslongchamps, but not characterised, as he only knew one species. Having obtained another, perfectly distinct, but identical in generic characters, I have characterised the genus, and dedicated it to M. Deslongchamps, to whom I think the merit of recognising it in the first instance belongs. Any one who reads the charming passage in M. Deslongchamps' Memoir (p. 119, vol, vii of the 'Mém. de la Soc. Linn. de Normandie') will understand the pleasure with which I dedicate this species to his son Eugene, under the name of *Deslongchampsia Eugenei*."—(*M'Coy's MS. notes*, 1849.)

[2] In the specimen in the British Museum, (figured Plate XII, fig. 13,) the apex is imperfect, but the direction of the striæ appear to indicate a reverse or posterior direction of the apex, and, consequently, analogous to the *Fissurellidæ*.

The anterior sulcus has a hollowed or spoon-shaped figure, and, like the other portion of the surface, is cancellated; but the longitudinal ribs are more closely arranged: the number of ribs in the circumference is about 50.

Height 3 lines, basal diameter 6 lines, width of anterior sulcus at the margin 2 lines.

Locality. It is very rare, and has been obtained only in the white stone of Eastcombs and Bussage: we are not aware that more than three examples have been found.

UMBRELLA? HAMPTONENSIS. Plate XII, figs. 12, 12*a*.

U. Testâ parvâ, depressâ; ambitu orbiculari; apice obtuso, depresso, centrali; costis radiantibus, lævibus, paucis, irregularibus, flexuosis; sulcis interstitialibus separatis.

Shell small, depressed; base orbicular; apex obtuse, discoidal, and central; ribs radiating, smooth, few, irregular, and waved; separated by interstitial sulcations.

This little shell is sometimes perfectly flat, but usually somewhat convex; it is extremely thin, and as the under surface has not been fully disclosed, it must be referred to *Umbrella* with some degree of doubt; it may, however, be probably considered as related to the patelliform shells. The basal diameter rarely exceeds 4 lines.

Locality. The soft shelly Oolite beneath the planking usually furnishes it in the neighbourhood of Minchinhampton: it is rare.

ORDER—OPISTHOBRANCHIATA, *M. Edwards.*

Family—BULLIDÆ.

BULLA, *Linn.*

Shell oval, ventricose, or cylindrical, generally thin and fragile, the last whorl more or less enveloping the preceding ones; spire umbilicated, or slightly produced; aperture large, the whole length of the shell, narrow above and dilated below; outer lip sharp.

The specimens of this genus from the Great Oolite are very few, and in a condition less satisfactory than could be wished. They have been obtained (with a single exception) from the upper beds of the formation to the east of the town of Minchinhampton. These beds usually consist of hard gray or brownish calcareo-siliceous sandstones, sometimes concretionary, and contain *Ceromyæ,* certain *Pholadomyæ,* and other shells which are never found in the lower and more shelly beds. The *Bullæ* are rare, but might possibly become less so, were the stone brought more under the inspection of workmen and connoisseurs; but being lifted only in small quantities during the winter season, from little excavations for road mending, and being, moreover, a very intractable material, none but a persevering local collector can be expected to obtain even a partial knowledge of its fossil contents. His reward will usually be, as in the present instance, mere imperfect casts, which contrast unfavorably with the products of the richer and softer shelly beds.

BULLA UNDULATA, *Bean*. Plate VIII, figs. 8, 8*a*.

BULLA UNDULATA, *Bean*. 1839. Mag. Nat. Hist., p. 61, fig. 22.
— — *Morris*. 1843. Cat. Brit. Foss., p. 140.

B. Testâ ovatâ, ventricosâ; apice umbilicato; umbilico contracto; labro interno sinuato; aperturâ magnâ, supernè angustatâ, infernè dilatiore; striis incrementi numerosis, longitudinaliter undatis.

Shell ovate, ventricose; apex umbilicated; umbilicus contracted; inner lip sinuated; aperture large; narrow above, wider below; striæ of growth numerous, longitudinally undulated.

Breadth, two thirds of the length.

The specimen figured by Mr. Bean in the 'Magazine of Natural History,' from the Cornbrash of Yorkshire, is about half as large again as the shell here described, and the inner lip is not so much sinuated; but in other respects it is very similar.

The general features of this shell bear a considerable resemblance to the *Bulla elongata*, Phillips, 'Geology of Yorkshire,' pl. iv, fig. 7; but it is much less elongated than that species.

Locality. Our specimen was obtained from the upper portion of the Great Oolite formation, in a bed of hard brown shelly sandstone, 95 feet above the Fullers-Earth, one mile and a half east of Minchinhampton. Rare.

BULLA LOLIOLUM. Plate VIII, figs. 16, 16*a*, 16*b*.

B. Testâ cylindro-ventricosâ; aperturâ angustâ, basi subdilatatâ, vertice subcontracto, profundè excavato, margine elato, et rotundato.

Shell cylindrical, but ventricose; aperture narrow, its base rather dilated, apicial cavity somewhat contracted and deeply excavated; the mamillary apex of the whorls being large, and rising considerably from the base of the cavity, but not so high as the outer margin; margin of the cavity elevated, narrow, and rounded.

The figure is nearly barrel-shaped, both the extremities appearing truncated and narrower than in the middle part. The character of the apicial cavity resembles that of several species of Cylindrites, figured upon the same plate; we have not been able to expose the base of the columella; but, judging from the general figure of the shell and of the aperture, we prefer to regard it as a *Bulla.* Upon comparing approximate forms it will be found that the figure of the base and cavity of the vertex is much wider than in *C. pyriformis;* the cavity is much more contracted and deeply excavated than in *C. bullatus;* a third shell, which more nearly approximates in form to our species, is the *Bulla Hildesiensis,* figured by Roëmer, (Verst. Nord. Ool. Geberges, t. ix, fig. 26,) in which, however, the form appears to be more elongated and the aperture more expanded towards the base.

Our shell would seem to be rare; we have obtained it in one small excavation only, about 100 feet above the Fullers-Earth, in concretionary sandstone: the disintegrating action of frost has enabled us to detach two specimens, and we have vainly endeavoured to extricate several others from a matrix harder than themselves.

Axis 7 lines, transverse diameter 5½ lines, diameter of the cavity 2 lines.

Locality. A superficial excavation one mile east of Minchinhampton.

Family—ACTÆONIDÆ.

CYLINDRITES—*Nov. gen.*

ACTÆON sp., *Sow., D'Orb.*

Testâ subcylindricâ vel ovatâ, spirâ parvâ; anfractibus plerumque planis, marginibus acutis, anfractu ultimo cylindraceo, aperturâ elongatâ, supernè linearis, infernè integrâ et rotundatâ; columellâ ad basim cortortâ, labro dextro tenui ad basim crassiori.

Shell smooth, subcylindrical or ovate; spire small; whorls usually flattened, with acute margins; the last whorl cylindrical; aperture lengthened; linear above; rounded and entire at the base; columella rounded, twisted near to the base, and slightly directed outwards; right lip thin, but thicker at the base.

The cylindrical figure, flattened and nearly concealed volutions, their acute margins, the linear aperture and columella directed outwards at the base, are the characters which entitle this group to be separated from Actæon (Tornatella Lam.), and constituted a new genus, it is in fact a Pyramidella in all but the basal notch; some of the species will be found to approach to the Cones, others the Bullæ, in each case more nearly than to Actæon. Species of this genus also occur in the Inferior Oolite, but they are perfectly distinct from those which are here described.

All the species of this genus have smooth shells; in Actæon most of the species are transversely striated or punctato-striate.

Mr. Sowerby, in the description of *Actæon cuspidatus,* remarks, "So novel is the contour of this little shell, that it is with difficulty compared to any before known; it agrees, however, with the essential characters of Actæon, but differs in general form, and in having a plain surface; it comes nearer in shape to Volvaria, but that has a truncated or notched base, and crenated lip to the aperture, besides several plaits upon the columella."

It has been proposed to form a new genus of it, to be called Cylindrites, but the following species (*A. acutus*) having a conical spire, connects it with *Actæon Noæ.* 'Min. Con.' 5, p. 77, 1825.

Notwithstanding their general resemblance to Actæon, we believe the species here described to be generically distinct from the typical forms of that genus, and have therefore proposed to retain the name Cylindrites for them.

The genus may be divided into two sections:

A. Species with the spire elevated and acute.

B. Species with the spire depressed and mammillated.

The species belonging to the second section appears to pass into the Acteonellæ of the cretaceous system.

A. Species with the spire elevated and acute.

Cylindrites acutus. *Sow.* sp. Pl. VIII, fig. 9, 9 *a, b.*

Actæon acutus, *Sow.* 1824. Min. Con., t. 455, fig. 2.
— — *Morris.* 1843. Cat. Brit. Foss., p. 138.
— — *D'Orb.* 1850. Prod. Paléont., p. 299.
— — *Bronn.* 1848. Index Palæont., p. 10.

Testâ subcylindricâ, spirâ conicâ, apice acuto, anfractibus (4) *planis seu subconvexis; anfractu ultimo margine rotundato.*

Shell subcylindrical, spire conical, apex acute; whorls (4) flat or slightly convex; the last volution rounded at its upper margin.

Locality. This shell occurs in much greater numbers than all the individuals of the other species put together; it may, in fact, be considered as one of the most common univalves in the Great Oolite near Minchinhampton.

It occurs in the Oolite at Ancliffe, Wiltshire, whence the original specimens were obtained, which are figured and described in the 'Mineral Conchology,' and Mr. J. de C. Sowerby has kindly allowed us the use of the same for examination and comparison.

Cylindrites cuspidatus. *Sow.* sp. Pl. VIII, fig. 10, 10*a.*

Actæon cuspidatus, *Sow.* 1824. Min. Con., t. 455, fig. 1.
— — *Morris.* 1843. Cat. Brit. Foss., p. 138.
— — *D'Orb.* 1850. Prod. Paléont., p. 299.
— — *Bronn.* 1848. Index Palæont., p. 10.
Tornatella cuspidata, *Deslongchamps.* Mém. Soc. Linn. de Normandie, vol. vii, p. 136, t. x, figs. 25, 26.
— — *Brown.* Illust. Foss. Conch., p. 85, t. xliii, figs. 11, 12.

Testâ cylindricâ, spirâ parvâ sub-inversâ, apice mammillato; anfractibus angustis planis; anfractu ultimo margine rotundato.

Shell cylindrical; spire small, somewhat inversed in the latter volutions; apex mammillated; volutions narrow, flattened; the last one rounded at the upper margin.

The upper margin of the last whorl rises as high as the one or two preceding ones, leaving their edges exposed so that the small mammillated apex and one or two first whorls seem to rise from a cavity. In the character of its spire this shell forms a passage to the remaining species, in none of which does the apex of the spire rise higher than the margin of the last whorl, the vertex is consequently more or less bowl-shaped or concave, the volutions never being entirely concealed, but exhibiting their upper edges.

This is a rare shell, and, with the preceding species, is found indifferently in all the beds of shelly oolite belonging to this Formation.

Locality. Minchinhampton Common; Ancliff, Wiltshire; Langrune, France.

CYLINDRITES ANGULATUS. Pl. VIII, fig. 11, 11 *a, b.*

Testâ cylindricâ; spirâ mediocriter elatâ, sub-concavâ; apice acuto; anfractibus (8) *angustis supernè angulatis.*

Shell cylindrical; spire moderately elevated, with rather concave sides, and an acute apex; volutions eight, narrow and angular in their upper part.

The general figure of this shell is somewhat shorter than *C. acutus,* the volutions are very narrow and angular, which, together with the somewhat concave spire, give it a well-marked form; it is more common than the last species.

Locality. The upper beds of the Great Oolite near Minchinhampton.

CYLINDRITES ALTUS. Plate VIII, figs. 12, 12*a, b.*

C. Testâ cylindricâ, subfusiformi, spirâ elatâ; anfractibus (8) *planis latis.*

A cylindrical, subfusiform shell, with an elevated spire, and eight flattened, and rather broad, volutions.

In this species the spire is flattened with an acute apex, which is equal in length to a third portion of the entire shell.

Locality. Minchinhampton Common. It is moderately rare.

B. Species with the spire depressed and mammillated.

A. CYLINDRICI.

CYLINDRITES CYLINDRICUS. Plate VIII, figs. 19, 19*a*, *b*, *c*.

C. Testá cylindricá, elongatá, truncatá; spirá depressá, vel obsoletá, vertice subconcavo; anfractibus angulatis, anfractu ultimo margine superiore acuto.

Shell cylindrical, lengthened, truncated; spire depressed, almost obsolete; vertex rather concave; volutions angular, the last one with the upper margin acute.

This is the most elongated and truncated species of the group, and might easily be mistaken for a specimen with an imperfect spire: in well-preserved specimens the apex may be observed to consist of two volutions, which rise above the others, forming a mammillated summit; the base of the shell is much contracted and lengthened.

Locality. It is rare, and has been found only in the "planking" of Minchinhampton Common.

CYLINDRITES EXCAVATUS. Plate VIII, figs. 17, 17*a*, *b*.

C. Testá cylindricá, truncatá; spirá inversá, apice mammillato, vertice magno profundè excavato; anfractibus numerosis, marginibus acutis notatis; anfractu ultimo subconvexo, margine superiore acuto, subcontracto; ceteræ notæ desunt.

Shell cylindrical, truncated; spire inverted; apex mammillated, vertex large, deeply excavated; whorls numerous, their upper margins acute; the last whorl somewhat convex, with an acute margin, and slightly curving inwards. Base not seen.

The specimen being rather imperfect at the base prevents our ascertaining with exactness the length of the species, which would appear to be intermediate to *C. bullatus* and *C. Thorentei*, but is certainly less elongated than the latter species; the vertex is large and very deeply crateriform, the apex not rising much above the centre of the deep concavity, and not so high as the margin of the last volution, the edges of the numerous whorls being visible in the concavity.

Locality. This example and a section of another are all which have been obtained; they occurred in the upper series of the Great Oolite formation, a little higher than the hard cream-coloured limestone, and in a rock of nearly equal compactness, two miles east of Minchinhampton, on the road to Cirencester; the same rock, also, contains *C. acutus* and *C. angulatus*, but the intractable nature of the material renders it extremely difficult to obtain good specimens.

Cylindrites brevis. Plate VIII, figs. 13, 13*a*, *b*.

C. Testâ parvâ, cylindro-truncatâ, apice amplo, plano, margine acuto; lateribus planis; aperturâ ad basin sub-expanso.

Shell small, truncated, cylindrical, vertex large, flattened, its margin acute; sides of the shell flattened, marked with lines of growth; aperture moderately expanded towards the base.

This is the most truncated species of the genus in the Great Oolite. The vertex is very wide, almost perfectly flattened; but the acute edges of the volutions are visible, and likewise the minute mamillary apex. These characters, together with the short figure, serve to distinguish it from *C. cylindricus,* Plate VIII, fig. 19, the shell which most nearly approaches to it. Axis 5 lines, diameter of vertex 3 lines.

Locality. Minchinhampton Common, where it is very rare.

Cylindrites Thorenti, *Buvign.*, sp. Plate VIII, figs. 22, 22*a*, *b*, *c*.

Bulla Thorentea, *Buvignier.* 1842. Géol. des Ardennes, p. 535, t. v, fig. 9.
— — *Buvignier.* 1843. Mém. Soc. Philom. Verd., ii, t. 5, fig. 11.
— — *D'Orb.* 1850. Prod. Paléont., p. 304.
— elongata, *Thorent.* Mém. de la Soc. Géol. de France, iii, p. 258. (Not Phillips, Geol. of Yorkshire.)

C. Testâ subcylindricâ, lateribus convexiusculis, spirâ parvâ, depressâ, contractâ; anfractuum marginibus solùm exsertis; aperturâ angustâ, columellâ ad basin uniplicatâ.

Shell subcylindrical, the sides somewhat convex, smooth, or slightly marked by the lines of growth; spire small, depressed, and contracted; the whorls with their margins only visible; aperture narrow, basal fold of the columella large.

The apicial excavation is more contracted than in either of the other species; the apex is large, but does not rise quite so high as the outer margin; the shell, in its general figure, is elongated and contracted at both the extremities. Axis 9 lines, greatest transverse diameter 4 lines, diameter of the terminal excavation 1 line.

Locality. Minchinhampton Common; it occurs in the bed of planking, but is very rare.

M. A. Buvignier states that this fossil is found in the white limestone of the Great Oolite in the environs of Rumigny. M. Thorent has also found it near Aubenton, and mentions it in the Memoir above referred to, under the name of *Bulla elongata,* as occurring in the Coral Rag; this is considered to be an error by M. Buvignier, as the bed containing it, in following its course into the Ardennes, is undoubtedly beneath the Oxford Clay.

B. PYRIFORMI.

CYLINDRITES BULLATUS. Plate VIII, figs. 18, 18*a*, *b*, *c*.

? CONUS ? MINIMUS, *Archiac.* 1843. Mém Soc. Géol. de France, tom. v, t. 30, fig. 9.
ACTÆON MINIMUS, *D'Orb.* 1850. Prod. Paléont., p. 299.
ACTÆONELLA MINIMA, *Bronn.* 1848. Index Palæont., p. 13.

C. Testâ subcylindricâ, vel ovatâ; spirâ depressâ, inversâ; apice mammillato; anfractibus numerosis, marginibus rotundatis; anfractu ultimo, subconvexo, basi contracto.

Shell subcylindrical, ovate, or bullæform; spire depressed, inversed; apex mammillated; whorls numerous, with rounded margins; the last whorl somewhat convex, with a contracted base.

This form is much shorter than the last, and less flattened; the apex of the spire does not rise higher than the margin of the last whorl; it is mammillated, and consists of three minute volutions; the vertex is moderately large and crateriform. This species is very rare, and has only been observed in the "planking."

Locality. Minchinhampton Common. Aubenton, France.

CYLINDRITES PYRIFORMIS. Plate VIII, figs. 20, 20*a*, *b*, *c*; 21.

C. Testâ cylindro-pyriformi, cavâ apiciali contractâ profundâ, margine acuto elevato; aperturâ ad basim vix dilatatâ, plicis magnis.

Shell cylindrical or pyriform; the apicial cavity contracted and deeply excavated, having an acute and somewhat elevated margin; aperture linear; the folds on the columella large.

This shell is more pyriform than its congeners, the anterior extremity being short but attenuated, and the apicial cavity deep and contracted. The cast (fig. 21) has not the produced acute margin to the cavity exhibited by the shell (fig. 20), the cavity consequently appears smaller; the apex of the spire is large but deeply situated.

Axis 7 lines, greatest transverse diameter 4½ lines, diameter of the cavity 1½ lines.

Locality. The planking of Minchinhampton Common. Casts of this shell occur higher in the series in shelly hard sandstone one mile east of Minchinhampton; in both positions it is rare.

ACTÆONINA, *D'Orbigny*, 1850.

COCHLITES CYLINDROIDES, *Luid.* 1760.
ACTÆON, sp., *Phillips.* ACTÆON, sp., *Sow.*
UTRICULUS ? *Brown.* 1845. Elements of Fossil Conch.
— *Brown.* 1849. Illustrations of Fossil Conch.

C. Testâ ovato-oblongâ; spirâ sub-elatâ; anfractu ultimo magno, elongato; aperturâ longitudinalitèr anfractui ultimo nonnunquam pari, supernè angustatâ, infernè latiori; labris continuis, tenuissimis, labio interno non reflecto.

Shell ovately oblong; spire rather elevated; the last whorl large and elongated; aperture sometimes as long as the last whorl, narrow in its posterior, wider in its anterior part; lips continuous and very thin, the inner lip not reflected upon the columella.

The genus *Utriculus* was established by Capt. Brown, upon the recent *Bulla obtusa*, and was afterwards used to comprise certain species of recent and fossil shells, previously referred by authors to *Bulla*, *Actæon*, &c.[1] Although the general form of the shells thus classed together is somewhat similar, this character cannot always be considered as definite, inasmuch as the animal inhabitant of the fossil species may have materially differed from the recent type. Alc. d'Orbigny, in recognising the generic differences of some allied forms, described as *Tornatella*, subsequently proposed in the 'Prodrome de Paléontologie,' the name *Actæonina* for their reception. The genus *Orthostoma*, instituted by Deshayes, includes an allied series of shells, and connecting them with *Actæon* and *Cylindrites*, if we may judge from the figures given in the 'Traité Elementaire de Conchyliologie,' but of which no description has yet been published. Upon the ground, therefore, of the doubtful generic identity of the recent *Bulla obtusa* with our fossil shells, we have preferred to adopt the name proposed by D'Orbigny.

ACTÆONINA OLIVÆFORMIS, *Dunker*. sp. Plate VIII, fig. 14.

BULLA OLIVÆFORMIS, *Koch* and *Dunker*. 1837. Nordd. Oolith., t. v, fig. 3.
ACTEONINA — *D'Orb*. 1850. Prod. Paléont., p. 353.

A. Testâ ovato-cylindraceâ, lævi; spirâ productiusculâ, acutâ; anfractibus spirâ subconvexis; aperturâ supernè angustatâ.

Shell ovately cylindrical, smooth; spire rather small, or but little produced; whorls rather convex; the upper part of the aperture narrow.

Locality. Three examples only, varying much in size, are in our collection. They occurred in the soft shelly stone (termed ovenstone) which overlies the weatherstones at Minchinhampton Common. It is a thinly-laminated deposit, which is sometimes nearly made up of the valves of *Ostrea acuminata;* when these are absent, their place is occupied by a multitude of small bivalves; or, when these again become scarce, other and more interesting forms occur, among which may be ranked the present species.

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[1] With regard to the comparative generic differences of the family *Bullidæ*, the reader is referred to an interesting paper by Mr. Clark, published in the 'Annals of Natural History,' for August 1850, from which it appears, by a careful study of the structure of the animals, that the generic subdivisions established by some authors in this group are not well characterised.

ACTÆONINA? PARVULA, *Roemer*, sp. Plate V, figs. 11, 11*a*, 12.

BUCCINUM PARVULUM, *Roemer.* 1836. Nordd. Oolith., p. 139, t. xi, fig. 23.
ACTEONINA PARVULA, *D'Orb.* 1850. Prod. Paléont., p. 353.

A. Testâ parvâ, ovato-conicâ; anfractibus (4) *subconvexis superioribus, lateribus subplanis; aperturâ integrâ elongatâ, basi angustatâ, columellâ contortâ.*

Shell small, ovately conical; whorls (4) rather convex upon their upper portions, but flattened upon their sides; aperture entire, elongated; base narrow; columella twisted.

This little shell varies much in the length of the spire, specimens with narrow whorls having a greater degree of convexity at their upper part than the others, but in all of them the spire is shorter than the last volution. The largest specimens have an axis of 4 lines, and a transverse diameter of nearly 3 lines.

Locality. Minchinhampton. It is found not unfrequently in all the quarries of the district, and is common to the shelly beds.

ACTÆONINA? BULIMOIDES. Plate VIII, fig. 15.

A. Testâ ovato-elongatâ, lævi; spirâ elatâ obtusâ; anfractibus (3—4) *subconvexis, anfractu ultimo subcylindrico; aperturâ ovatâ; labro sinistro incrassato.*

Shell ovately elongated, smooth, with an obtuse elevated spire; whorls (3—4) somewhat convex, the last whorl subcylindrical; aperture ovate; inner lip thickened but not broad.

The general figure is pupæform; the aperture in length does not exceed half that of the entire shell.

This species has been provisionally arranged under *Actæonina,* although the great thickness of the shell and expanded columellar lip do not well agree with that genus, and rather approximate it with *Bulimus.* In general form it is very near to the *Chemnitzia Cornelia,* D'Orb., 'Terr. Jurass,' t. 245, figs. 2, 3, from the Coral Rag of France; and both species may hereafter be found to belong to a genus distinct from *Chemnitzia* and *Actæonina.*

Locality. Minchinhampton. The specimen figured is the only example which has come to our knowledge. The exact bed from which it was obtained is rather doubtful; but, judging from the matrix to which it is attached, we should infer that its position was probably the upper portion of the Great Oolite.

ADDENDA.

AMMONITES GRACILIS, *Buckman.* Plate XIII, figs. 2, 2*a*; and Plate I, fig. 3.

The description of this species is given at page 12, but the additional figure is here given (Plate XIII, fig. 1,) to illustrate the form and general character of the more mature shell, which differs considerably from the young state of it. (Plate I, fig. 3.)

It has the general form of *Am. Charmassei,* D'Orb.; but the costæ in *A. gracilis* are not interrupted over the back as in that species, and the volutions are more fully exposed.

PTEROCERAS WRIGHTII. Plate XIII, fig. 1.

P. Testá fusiformi, tumidá; anfractibus (6) *rotundatis, lævibus vel spiraliter striatis; ultimo gibbo, transversim carinato; carinis tribus rotundatis inæqualiter remotis; in digitos longiores productis; dorso ad angulum tuberculis duabus magnis; labro quinque? digito, digitis in ætate adultá longissimis, flexuosis, recurvatis; caudá longissimá arcuatá.*

Shell fusiform, volutions 6, rounded and smooth, or faintly striated; the body-whorl inflated, and having three indistinct carinæ developed on its upper surface, two of which have a transverse prominent tubercle; each carina leads to a digitate process; labial wing short, and terminating in four long slender flexuous digitations; the first digitation ascends close to the spire, and is attached to it; it curves a little outwards, and then extends backwards an inch and a quarter beyond the apex of the spire, where it is broken off;[1] the second curves gently outwards and backwards; the third is broken off three quarters of an inch from the labial wing; a remaining fragment indicates that it curved gently outwards, and is represented by a dotted line in the figure; the fourth passes forwards for an inch and a half, and then curves outwards; the canal is long, and arched backwards.

This fine fossil presents some points of resemblance to *Strombus Oceani* and *S. Ponti,* Al. Brongniart, but the latter species has upwards of six carinæ upon the last whorl. In size it exceeds all the other Great Oolite examples of the *Strombidæ,* and would seem to be very rare. One specimen in the cabinet of the author, which has not the wing developed, and is in other respects imperfect, is the only other known example. The present remarkable shell is in the cabinet of Dr. Wright of Cheltenham, who has kindly communicated it, and to whom it is dedicated. The cast of a shell figured by Goldfuss, t. 173, fig. 3, under the name of *Buccinum antiquorum,* from the dolomitic Oolite of Bavaria, may possibly belong to an allied species of the same genus.

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[1] There are traces of another digitation between the first and second above described, arising near to the base of the former, but apparently broken off in the specimen figured.

Locality. Minchinhampton Common, in the beds of planking.

NERITOPSIS VARICOSA. Plate XI, figs. 20, 20*a*; Plate XIII, fig. 5.

N. Testâ neritiformi, ovato-oblongâ, varicibus magnis longitudinalibus (circâ 10 *in ambitu), plus minusve elatis, et lineis numerosis, transversis, regularibus, elatis decussatis; lineis cum striis densissimis perpendicularibus instructis.*

Shell neritiform, ovately oblong; varices large, longitudinal (about 10 in a volution), more or less elevated, decussated with numerous regular, elevated, and transverse lines; the lines are impressed with extremely fine and dense perpendicular striæ; the aperture round.

A very thick ovate shell; the varices vary much in magnitude, so that in some specimens they are nearly obsolete, but the large encircling lines are always conspicuous; the dense striations upon the lines are only visible under a magnifier.

Locality. Minchinhampton Common, where it is rare; but it occurs not unfrequently in the middle division of the Inferior Oolite.

TROCHUS SPIRATUS, *D'Archiac.* Plate XIII, figs. 6, 6*a*. Plate X, figs. 2, 2*a*, 2*b*.

TROCHUS SPIRATUS, *Archiac.* 1843. Mém. Soc. Géol. de France, tom. v, p. 378, t. 29, fig. 4*a*—*c*.
— — *Bronn.* 1848. Index Palæont., p. 1306.
— — *D'Orb.* 1850. Prod. Paléont., p. 300.

T. Testâ conicâ, apice acuto, anfractibus (4—5) *lateribus planis, subtèr medio subangulatis, cingulis et lineis ornatis; cingulis duobus, primo propè suturam approximato, secundo majori, acuto, parte inferiore anfractuum sito; lineis inter cingulos striis longitudinalibus impressis; basi lævi subconvexâ, umbilico nullo.*

Shell conical, apex acute, whorls 5, their sides flattened, somewhat angulated beneath their middle portions, and encircled with bands and lines; the bands are two in number; the first is wide, flattened, and placed close to the suture; the second is prominent, acute, forming a slight angle, and placed near to the base of the whorls; between the bands are several rather obscure encircling lines, which are indented by longitudinal striæ; base smooth, slightly convex; no umbilicus.

The variation in the prominence of the bands, of the lines, and of the general state of preservation, occasions considerable diversity in the aspect of this species, and requires several examples for its elucidation. The figures given at Plate X, figs. 2, *2a, 2b,* do not exhibit the degree of angularity in the whorls and prominence in the bands which is usually seen, and the longitudinal indentations are more than usually prominent The fine encircling striæ, although not shown in the specimen figured by M. D'Archiac, are particularly mentioned in the description of the species. The axial and basal diameters are nearly equal.

Locality. It is tolerably abundant in the Minchinhampton district, occurring in all shelly beds. Eparcy, France.

CLASS—ANNELIDES, *Cuvier.*

SERPULA OBLIQUE-STRIATA. Plate V, fig. 19, 19*a*.

L. Testâ vermiformi, lateribus subcompressis, striis crebris irregularibus, obliquis anticè curvatis, in cristam longitudinalem flectis.

Shell vermiform, the sides slightly compressed, with striæ closely arranged, irregular, oblique, curved towards the anterior extremity, and bent into a longitudinal ridge.

Locality. It is rare, and occurs in the planking of Minchinhampton Common. Of the few specimens seen, none exceed an inch in length, and 2 lines in their transverse diameter.

Note on the term "PLANKING."

It will be observed that the term "*planking*" is frequently used in stating the position and range of fossils from Minchinhampton Common. This is a name applied indifferently by quarrymen to any stone, the beds of which divide into thin horizontal slabs or planks. At Minchinhampton Common it is understood to indicate the uppermost of that series of shelly beds which are known as the *weatherstones,* or stones which are supposed to be capable of resisting the disintegrating action of frost. At Bussage and Eastcombs the term *white stone* is employed by quarrymen when speaking of this bed, which at the two latter localities has quite changed its mineral character. It is not improbable that this white stone is the English representative of the *pierre blanche* of the Great Oolite of Normandy, which has yielded to M. Deslongchamps so numerous a series of shells.

THE MOLLUSCA

OF

THE "GREAT OOLITE OF YORKSHIRE."

Class—Cephalopoda.[1]

Belemnites giganteus, *Schloth.* Plate XIV, figs. 4, 4*a*.

Belemnites giganteus, *Schloth.* 1813. Min. Taschenb., vii, p. 70.
— — *Schloth.* 1820. Petref., p. 45, No. 1.
— ellipticus, *Miller.* 1823. Geol. Trans., 2d Series, ii, pl. 8, figs. 14—16.
? — — *Blainville.* 1827. Mém. Belemn., p. 102.
? — gladius, *Blainville.* 1827. Mém. Belemn., p. 86, pl. 2, fig. 10.
? — compressus, *Sow.* 1828. Min. Con., t. 590, fig. 4.
— Aalensis, *Voltz.* 1830. Mém., p. 60, pl. iv, fig. 7.
— — *Zieten.* 1830. Pet. Wurtemb., pl. 19, fig. 1.
— grandis, *Zieten.* 1830. Pet. Wurtemb., pl. 20, fig. 1.
? — compressus, *Phil.* 1835. Geol. of Yorksh., vol. i, pl. 9, fig. 38.
— Aalensis, *Phil.* 1835. Geol. of Yorksh., vol. i, p. 124.
— giganteus, *Quenstedt.* 1843. Flözg. Würtemb., p. 329.
— — *D'Orb.* Ter. Jurrass., pl. 14, fig. 15.
— — *D'Orb.* Prod. Paléont., p. 261.

B. Testâ elongatâ, compressâ, crassâ, acuminatâ vel subinflatâ, posticè acuminatâ, lateraliter sulcatâ, anticè dilatatâ; aperturâ subovali. Alveolo angulo, 20—25°. (D'Orb.)

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[1] The following species of Mollusca are chiefly figured from the collection of Mr. Bean, and the localities are given upon the authority of that gentleman. They include all the species of univalves enumerated by Professor Phillips as occurring in the "Gray Limestone or Oolite of Cloughton, Brandsby, and Cave" ('Geol. of Yorkshire,' vol. i, p. 123, &c.); and most of the specimens illustrated in this Monograph appear to have been obtained from the Yorkshire coast. We have previously assigned our reason for keeping the fossils of this locality distinct from those of the West of England, and shall merely introduce the following general remarks by Prof. Phillips as bearing upon the subject. "The distribution of the organic remains in the 'road-stone,' or slaty rock of Brandsby, Cave Oolite, and Inferior Oolite sand, has yet been carefully ascertained at only a few points; and the following observations will probably here-

The guard is more or less elongated and compressed, sometimes conical and acuminated towards the extremity; at other times contracted near the apex, and enlarged rather suddenly towards the alveolus; the furrows, with which the extremity is marked, vary in different specimens, both in their number, depth, and size; there are generally two on the dorsal part, one being prolonged much more than the other. The angle of the alveolar cavity varies, according to M. D'Orbigny, from 20 to 25°, and is inclined towards the ventral side. The aperture is generally of an oval form.

This is a very variable species, and has consequently been described under a great variety of names. M. D'Orbigny, after carefully studying a large number of specimens obtained from many localities, infers that the variety of form assumed by this species is mainly to be attributed to sexual differences.

This species is generally considered to be characteristic of the Inferior Oolite in England, Germany, and France; but we have not been enabled to detect any specific difference between the specimens forwarded by Mr. Bean, from the Bath Oolite of Yorkshire, under the names of *B. Aalensis*, *B. compressus*, and typical specimens of the *B. giganteus*, obtained from the Brown Jurassic formation of Wurtemberg.

Locality. The Gray Oolite near Scarborough. Inferior Oolite of the west and south of England.[1]

AMMONITES MACROCEPHALUS, *Schloth.* Plate XIV, fig. 2.

AMMONITES MACROCEPHALUS, *Schloth.* 1813. Min. Taschenb., vii, p. 70.
— — *Schloth.* 1820. Petref., p. 70, No. 16.
— — *Zieten.* 1830. Pet. Wurtemberg, t. v, figs. 1, 4, 7; t. xiv, fig. 3.
— — *Quenstedt.* 1843. Flözg. Würtemb., p. 363.
— — *D'Orb.* Ter. Jurrass., p. 430, pl. 151.
— — *D'Orb.* Prod. Paléont., p. 297.
? — TEREBRATUS, *Phil.* 1835. Geol. of Yorksh., vol. i, p. 116.

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after receive several corrections. At present it appears to me that the 'road-stone' is characterised by the great abundance of *Gervillia acuta* and *Crassina minima*, and by the presence of *Pholadomya acuticostata*, *Rostellaria composita*, and the genus *Actæon*. Where this rock is united with the Middle Oolite, as at White Nab, these fossils commonly lie near the top; where it is entirely deficient (as at Ewe Nab), they are scarcely to be found. The top of the Cave Oolite (as under Gristhorpe Cliffs, at Ewe Nab, Owlston, and Ellerker) is generally marked by abundance of *Millepora staminea*, and plates and spines of *Echini*, and columnar joints of *Pentacrinus caput Medusæ*. In the substance of the rock occur *Belemnites*, *Isocardiæ*, *Pholadomyæ*, *Cucullææ*, *Pernæ*, *Pinnæ*, *Plagiostomæ*, *Pectines*, and *Terebratulæ*. So large a proportion of its organic contents occurs likewise in the Inferior Oolite sand beneath, that it is difficult to point out what seem to be characteristic."

[1] We have had the opportunity of examining some fine specimens of this species in the collections of Mr. Bowerbank and Mr. Baber.

A. Testá discoideá, subinflatá; anfractibus involutis subcompressis, rotundatis, lateribus 26—30 *costatis; costis subrotundatis, obtusis, in medio laterum bi vel trifurcatis continuis; aperturá semilunari, umbilico angustato.*

A discoidal, somewhat inflated, shell, with rather subcompressed volutions, and a narrow and deep umbilicus; margin of the umbilicus with 26 to 30 obtusely-rounded ribs, which subdivide into two or three smaller ones in passing over the back; aperture semilunar, deeply impressed by the previous volution.

Locality. Near Scarborough.

AMMONITES BLAGDENI, *Sow.* Plate XIV, fig. 3*a*, *b*.

AMMONITES BLAGDENI, *Sow.* 1813. Min. Con., pl. 201.
— CORONATUS, *Schloth.* 1813. (Not *Am. coronatus*, Brug., 1789.)
— — *Zieten.* 1830. Pet. Wurtemb., t. i, fig. 1.
— BLAGDENI, *Phil.* 1835. Geol. of Yorksh., vol. i, p. 124.
— CORONATUS, *Quenstedt.* 1843. Floz. Würtemb., p. 326.
— BLAGDENI, *D'Orb.* Ter. Jurrass., p. 396, t. 132.

A. Testá discoideá, subcylindricá, latè umbilicatá; anfractibus subdepressis, lateribus declivibus, costatis; costis 20—28 *externè tuberculatis, subacutis; dorso subconvexo, transversim costato; aperturá transversá, quadrangulari.*

A discoidal, thick, and widely-umbilicated shell, formed of rather depressed quadrangular volutions, ornamented with 20 to 28 obtuse costæ, terminating in spiniform tubercles on the outer margin, and from each of which arise 3 to 5 smaller costæ, which pass over the back; the aperture is transverse and quadrangular.

In some specimens the tubercles are sharper, differently formed, and more numerous than in others.

In the shell figured, which measures about six inches diameter, there are 17 marginal ribs; in another specimen from the same locality (Scarborough), about one foot in diameter, the number is 28. The numerical proportion of these costæ, however, do not always increase or decrease with regularity during the progress of growth. There are two specimens of *Am. coronatus*, Zieten, in the British Museum, which are certainly identical with our shell, in one of which the inner volution has 25, and the outer 27, marginal costæ, showing an increase; in the other specimen, the inner whorl has 21, and the outer only 17 costæ, showing a decrease in their number. The specimen figured by M. D'Orbigny has only 15 tubercular costæ surrounding the umbilicus.

Locality. Near Scarborough; Inferior Oolite, Somerset; Bayeux, &c., France; Brown, Jura δ, Stuiffen, Wurtemberg. (*Quenstedt.*)

AMMONITES BRAIKENRIDGII, *Sow.* Plate XIV, fig. 1.

AMMONITES TRIPTOLEMUS, *Bean.* MS.
? — BRAIKENRIDGII, *Sow.* 1813. Min. Con., t. 184.
— — *D'Orb.* Ter. Jurrass., t. 135, figs. 2, 3.

A. Testâ discoideâ, anfractibus (5—6) *expositis, subrotundatis, costatis; costis* (30—36) *externè tuberculatis, in medio laterum bifidis, subindè trifidis, continuis; dorso subconvexo; aperturâ transversâ, subdepressâ, externè angulatâ.*

A discoidal shell, with 5—6 exposed, somewhat rounded and costated volutions; with 30—36 marginal costæ, tuberculated externally, from each of which arise, about the middle of the side, 2 and sometimes 3, rather obtuse smaller ribs, passing over the back; aperture wider than high, somewhat convex, with angular sides.

This Ammonite (forwarded to us with the name, *A. Triptolemus*), belonging to the section *Coronarii*, appears to be intermediate to *A. Humphriesianus* and *A. Braikenridgii*, with the latter of which it is the more closely allied, but differing from it by the smaller costæ (in the cast) not being wholly enveloped by the later volutions. We regard the specimen figured as only the adult state of this species.

Locality. Near Scarborough.

CLASS—GASTEROPODA.

ALARIA PHILLIPSII, *D'Orb.* sp. Plate III, fig. 5; and Plate XV, figs. 15, 15*a*.

? ROSTELLARIA HAMUS, var. *β*, *Deslongchamps.* 1842. Mém. Soc. Linn. de Normandie, tom. vii, p. 174, t. 9, fig. 36.

(See description, *antea* page 18.)

We have provisionally retained (page 18) M. D'Orbigny's specific name for the Yorkshire shell, believing that the one figured as *Rostellaria composita*, by Phillips, presented certain differences from that described in the 'Min. Conch.,' occurring in the Oxford Clay of Weymouth. But Mr. Sowerby distinctly states that he has received the same species from near Scarborough, so that the differences may prove, when a larger number of specimens shall have been examined, to be due merely to variations arising from local conditions. The Yorkshire shell appears to be identical with *Rostellaria hamus*, var. *β*, of M. Deslongchamps, cited above, from the Great Oolite of Ranville.

Locality. Near Scarborough. This species is also found in the Inferior Oolite of Yorkshire, and in the same formation at Dundry and Bridport.

CERITHIUM BEANII. Plate XV, fig. 5.

C. Testâ parvâ, turritâ, apice obtuso, anfractibus numerosis angustis, subplanis, 5 *costatis; costis tuberculosis, tuberculis circa* 16 *in ambitu; costis inæqualibus; suturis anfractibus profundè depressis.*

Shell small, turreted; apex obtuse; volutions numerous, narrow, rather flattened, encircled with five rows of costæ; costæ tuberculated, the tubercles being about 16 in a volution; ribs unequal; the sutures of the whorls deeply depressed.

The third and fifth row of costæ are less prominent than the others, the tubercles are large and prominent, the length of a volution is less than half its transverse diameter, the first two volutions are nearly smooth. Length 5 lines, transverse diameter 2 lines.

Locality. Near Scarborough.

NATICA ADDUCTA. Plate XV, figs. 17, 17*a*.

NATICA ADDUCTA, *Phillips.* 1835. Geol. of York., vol. i, t. 9. fig. 30.
— — *Williamson.* Geol. Trans., 2d Series, vol. v, p. 241.
— — *D'Orb.* 1850. Prod. Paléont., p. 264.

N. Testâ globosâ, spirâ elatâ, anfractibus (4) *convexis, supernè rotundatis, suturis depressis, anfractu ultimo obliquo; aperturâ ellipticâ, umbilico obtecto.*

Shell globose, spire elevated and pointed, whorls (4) convex, with depressed sutures, their upper portions rounded; the last whorl oblique; aperture large, elliptical; inner lip with a covered umbilicus.

Natica grandis, Goldfuss, is our only Great Oolite species which approaches near to this form; but that shell, though greatly expanded, has not more volutions than the present species, a fact which militates greatly against their identity. Length 9 lines, breadth 8 lines.

Locality. Great Oolite near Scarborough. The original specimen figured by Phillips.

NATICA PUNCTURA. Plate XV, figs. 18, 18*a*.

LITTORINA PUNCTURA, *Bean.* 1839. Mag. Nat. Hist., p. 62, fig. 23.
— — *Morris.* 1843. Cat. Brit. Foss., p. 149.

N. Testâ ovato-ventricosâ, spirâ elatâ, acutâ; anfractibus (6) *convexiusculis, suturis profundè impressis; anfractu ultimo magno, punctato et cingulato; punctis minutis, in* *lineis transversis sed irregularibus instructis, et lineis tenuissimis longitudinalibus transversisque decussatis; apertură ovată, labro externo tenui.*

Shell ovately ventricose, spire elevated and pointed, whorls (6) rather convex, with deep sutures; the last whorl large, oblique, its surface punctated and cingulated; punctæ minute, disposed in close but irregular arranged transverse lines; they are decussated by numerous very fine lines, both longitudinal and transverse; the entire surface of the whorl is likewise divided into several (4 or 5) encircling zones by as many lines, which are prominent, rendering the spaces between them rather flattened; aperture ovate, outer lip thin, inner lip rather flattened and excavated. Axis 11 lines, transverse diameter 8 lines.

The following is Mr. Bean's original notice of this species:

"Shell turbinated, finely striated longitudinally and transversely, which, under a high magnifier, gives it a very beautiful appearance; whorls (6) rounded and well divided, the body whorl occupying one half the length of the shell. Aperture elliptical, pillar lip thick and a little flattened, outer lip very thin; length nearly ¾ inch, breadth ½ inch. The only specimen procured from the Cornbrash; but in the Inferior Oolite at Peak Hill it is not uncommon. The specimens found there are larger, coarser, and the spire is not so much produced."

Locality. Bath Oolite near Scarborough. In the collection of Mr. Morris.

NATICA ? (EUSPIRA) CINCTA. Plate XV, fig. 20.

PHASIANELLA CINCTA, *Phillips.* 1835. Geol. of York., vol. i, t. 9, fig. 29.
— — *Williamson.* Geol. Trans., 2d Series, vol. v, p. 241.
— — *D'Orb.* 1850. Prod. Paléont., p. 267.

N. Testă ovată, spiră elată, anfractibus (4) *latis, supernè carinatis, suturis canaliculatis; anfractu ultimo, bicarinato; apertură amplă, suborbiculari.*

Shell ovate, spire elevated, whorls (4) broad, their upper portion with an obtuse encircling carina; the sutures channelled; the last volution, with an obtuse carina, occupying very nearly the middle of the volution; aperture large and suborbicular.

The specimen placed at our disposal, by the kindness of Mr. Bean, is the original one figured by Professor Phillips. It is rather compressed, which gives an appearance of greater breadth to the shell than it possessed; the perfect form would approach our *E. pyramidata*, from which it is distinguished by the second carina, which is not less strongly marked than the upper one. Length 15 lines, breadth (uncompressed) 10½ lines.

Locality. Great Oolite near Scarborough.

NERITA PSEUDO-COSTATA. Plate XV, figs. 3, 3*a*.

NERITA COSTATA, *Phillips.* 1835. Geol. of York., vol. i, t. 11, fig. 32.
— — *Morris.* 1843. Catalogue, p. 154.
— PSEUDO-COSTATA, *D'Orb.* 1850. Prod. Paléont., p. 264.

N. Testâ parvâ, subhemisphæricâ; spirâ parvâ, depressâ; costis longitudinalibus, regularibus rotundatis et lævibus.

Shell small, subhemispherical; spire small and depressed; ribs longitudinal, numerous, regular, rounded, and smooth.

This shell appears to be identical with the well-known Inferior Oolite species. Occasionally there is some little irregularity about the costæ, and they are not always so prominent as in the Yorkshire example. Size that of a moderate-sized pea.

Locality. Near Scarborough; also in the Inferior Oolite of Yorkshire. (*Phillips.*)

EULIMA LÆVIGATA. Plate XV, fig. 4.

E. Testâ subulato-turritâ, apice acuto; anfractibus (11) *subconvexis, obsoletè costatis; anfractu ultimo symmetrico.*

Shell subulate, turreted; apex acute; whorls (11) very slightly convex, smooth, or with slightly-marked costæ; the last whorl symmetrical.

This little shell is very subulate, the length of the whorls being nearly equal to their transverse diameter. This character, and the degree of convexity, separates it from a shell very abundant in the Great Oolite at Minchinhampton, which we have described under the title of *Eulima communis.* In that species the volutions are fewer, and the shell is more pyramidal. Length 7 lines.

Locality. Near Scarborough.

CHEMNITZIA ? VETUSTA. Plate XV, fig. 7.

TEREBRA VETUSTA, *Phillips.* 1835. Geol. of York., vol. i, t. 9, fig. 27.
— — *Williamson.* Geol. Trans., 2d Series, vol. v, p. 241.
CHEMNITZIA — *D'Orb.* 1850. Prod. Paléont., p. 263.

C. Testâ elongatâ, turritâ; anfractibus (9) *subconvexis, longitudinaliter costatis; suturis depressis; costis circa* 12, *rotundatis lævigatis curvatis.*

Shell turreted, volutions (9) rather convex, and longitudinally costated; ribs, about 12 in a volution, rounded and smooth, bent from left to right; the sutures of the volutions deeply impressed.

The figure is lengthened, almost subulate, the convexity of the volutions being but slight; their transverse diameter exceeds their length by about one third. Longitudinal dimensions 5 lines, transverse diameter 2 lines.

Locality. Near Scarborough.

CERITHIUM GEMMATUM. Plate XV, fig. 6.

C. Testâ parvâ, turritâ; anfractibus convexiusculis, nodulis cingillatisque 5*; nodulis ovatis subdistantibus, circa* 24 *in ambitu.*

Shell small, turreted; volutions rather convex, encircled with five rows of nodules; nodules ovate, about 24 in a volution; the rows of nodules are slightly curved, and the last volution has from 7 to 9 rows.

The little nodules are regular, oval, their longer diameter being in the axis of the shell, and they are distant from each other about their own diameter; the number of volutions are but few, apparently not more than 7. Length 7 lines, transverse diameter 2 lines.

Locality. Great Oolite near Scarborough.

CHEMNITZIA ? SCARBURGENSIS. Plate XV, fig. 8.

C. Testâ magnâ, pyramidato-turritâ, lævi; anfractibus subplanis ad suturas subplicatis, aut vittâ latiusculâ transversâ, plus minusve convexâ notatis; aperturâ ovatâ, supernè strictissimâ; columellâ marginatâ, supra subcallosâ. ?

Shell large, pyramidal, turreted, smooth; whorls nearly flat, but with one fold near to their sutures, or with a broad transverse band more or less convex; aperture ovate, very narrow above; columella marginated, thickened above.

The upper border of the whorls is slightly turned, their junctions are strongly defined. The longitudinal diameter of the penultimate whorl is 7 lines, the transverse diameter 10 lines.

Locality. The specimen forwarded to us by Mr. Bean is from the dark-gray shale of the Great Oolite near Scarborough. It is only a cast, and much compressed, so that the specific character cannot be sufficiently determined.

TROCHUS LECKENBII. Plate XV, figs. 21, 21*a*.

T. Testâ conico-depressâ, anfractibus (4—5) *planis, costulis rotundatis crebris cinctis;*

costulis transversè dense-striatis; basi subconvexâ densè costulatâ et concentricè striatâ; umbilico nullo.

Shell conical, but depressed; whorls (4—5) flattened, encircled with closely-arranged, nearly equal rounded ribs; the ribs are densely striated longitudinally; the base is rather convex, having very closely-arranged costæ, crossed by concentric striæ; no umbilicus.

The junctions of the whorls are rather obscurely marked, and the lower margin of the last whorl is angulated. The little ribs upon the base are very delicate and fine; the outer lip is imperfect, and does not enable us to describe the aperture; but there is nothing visible upon the surface of the whorls which would indicate that it belongs to *Pleurotomaria*. The height is two thirds of the basal diameter.

Locality. Scarborough. In Mr. Leckenby's cabinet.

TROCHUS MONILITECTUS, *Phil.* Plate XV, figs. 1, 1*a*.

TROCHUS MONILITECTUS, *Phil.* 1835. Geol. of York., vol. i, t. 9, fig. 33.
— — *D'Orb.* Prod. Paléont., p. 265.

T. Testâ conicâ, anfractibus (8) *planis, suturis obscuris* 4—5 *costatis; costis crebris obliquè crenulatis.*

Shell conical, volutions (8) flattened, with indistinct sutures, and encircled with 4—5 rows of costæ; the costæ are closely arranged, and crenated obliquely.

The costæ are large, the crenations closely arranged, and pass obliquely from left to right. Length 4½ lines, basal diameter 3½ lines.

Locality. Near Scarborough. The original specimen figured by Phillips.

TURBO ELABORATUS, *Bean.* Plate XV, fig. 2, 2*a*; and Plate IX, figs. 27, *var.*

TURBO ELABORATUS, *Lycett.* 1850. An. Nat. Hist., vol. vi, p. 416, pl. 11, fig. 1.

T. Testâ subturritâ, apice acuto, anfractibus (4) *subconvexis, supernè planis, infernè costulis longitudinalibus numerosis, aliis transversis decussantibus; anfractu ultimo ventricoso obliquo, aperturâ ovatâ.*

Shell turreted, apex acute, whorls (4) convex, their upper borders flattened horizontally, their sides and lower portions, with numerous longitudinal ribs, transversely decussated by others; last whorl oblique; aperture entire, ovate.

The longitudinal ribs are rendered nodulous by those which are transverse; the latter are 4 or 5 in number; the last volution has numerous encircling ribs, but the longitudinal ones do not extend beyond the middle of the volution; and when more than four whorls have been completed, the last whorl is destitute of longitudinal ribs, but in lieu of them are very fine densely-arranged longitudinal lines. The latter features are not exhibited by the specimen from Scarborough; but one, of more advanced growth, from the Inferior Oolite near Minchinhampton, is much larger and more satisfactory. The upper portions of the whorls are flattened, smooth, and even a little sulcated; the inner lip is thin; the base is rounded, so that it neither exhibits the thickened lip of *Littorina,* nor the basal produced form of *Turbo.* Length of the Scarborough specimen 5 lines, transverse diameter of the last whorl 4 lines.

Locality. Great Oolite near Scarborough.

Turbo Phillipsii. Plate XV, figs. 12, 12*a*, *b*.

T. Testâ trochiformi, cingillatâque costatâ; costis striato-nodulosis; striis indentis; striis longitudinalibus numerosissimis; anfractibus planis; aperturâ subrotundâ, basi effusâ, vel productiori.

Shell trochiform, encircled with numerous ribs; ribs striated and nodulous; striæ longitudinal, very numerous, indenting the ribs; volutions flattened; aperture rounded; its base effuse, or produced anteriorly.

Two ribs, more prominent than the rest occupy the middle of the last whorl, and give it rather an angulated figure; the pointed extremity of the base removes it from the *Littorinæ.* Longer diameter 9 lines, transverse diameter 7 lines.

Named in compliment to the author of the ‘Geology of Yorkshire.’

Locality. Great Oolite near Scarborough.

Phasianella latiuscula. Plate XV, fig. 16.

P. Testâ ovatâ, spirâ acutâ, elatâ; anfractibus (6) *latis, convexiusculis; anfractu ultimo subventricoso.*

Shell ovate, spire acute, elevated; whorls (6) broad, convex, the last whorl rather inflated.

This may be considered as a form connecting our *P. elegans* and *P. tumidula;* the spire is much more elevated than in the latter species, and the whorls are wider than in the former. These remarks, however, are made with the reservation which must be exercised in describing casts, for the specimen figured is in that condition. The length is 1 inch, the transverse diameter 7 lines.

Locality. Near Scarborough.

PHASIANELLA STRIATA, *Sow.* Plate XV, fig. 19.

MELANIA STRIATA, *Sow.* 1814. Min. Con., tab. 47.
PHASIANELLA STRIATA, *Sow.* Min. Con., 1834. Index, p. 5.
TEREBRA — *Lonsdale.* Geol. Trans., 2d Series, vol. iii, p. 275.
— — *Morris.* 1843. Cat. Brit. Foss., p. 163.
MELANIA — *Roemer.* 1836. Nordd. Oolith., p. 158, t. 10, fig. 1.
— — *Goldf.* 1844. Petref., p. 112, t. 198, fig. 12.
PHASIANELLA — *D'Orb.* 1850. Prod. Paléont., p. 333.

P. Testâ turritâ, ventricosâ; anfractibus (7) *subconvexis et striatis; striis* (15) *transversis; basi profundè striatâ; aperturâ depressâ, suborbiculari; columellâ excavatâ.*

Shell turreted, ventricose; whorls (7) somewhat convex and striated; striæ but faintly impressed, and about 15 in number upon each whorl; the base deeply striated; aperture depressed, nearly circular; columella excavated.

The figure is subpyramidal, the length of the whorls being rather more than half their transverse diameter; the sutures of the whorls are deeply marked, the base of the last whorl is deeply grooved; the base of the aperture is very wide, and the transverse diameter of the aperture is nearly equal to the longitudinal. The length of the entire shell is about 3 inches, the transverse diameter through the last whorl is 21 lines.

Locality. Great Oolite near Scarborough. In the middle and west of England this species occurs in the upper beds of the Inferior Oolite and Coral Rag.

ACTÆON, *Montfort.* 1810.

TORNATELLA, *Lam.*

Shell ovate, volutions few, transversely striated; spire obtuse; aperture narrow, lengthened, entire; columella spirally thickened at its junction with the inner lip; outer lip thin, smooth.

ACTÆON SEDGVICI, *Phil.* sp. Plate XV, figs. 9, 9*a*.

AURICULA SEDGVICI, *Phil.* 1835. Geol. of York., vol. i, t. 11, fig. 33.
— — *Williamson.* Geol. Trans., 2d Series, vol. v, p. 241.
— — *Bronn.* 1848. Index Palæont., p. 136.
ACTEON — *D'Orb.* 1850. Prod. Paléont., p. 263.

A. Testâ parvâ, ellipticâ, transversìm striato punctatâ; striis crebris, punctis impressis; spirâ subconicâ, gradatâ; anfractibus subplanis, ultimo inflatu; aperturâ elongato-ellipticâ, angustatâ.

Shell small, elliptical, transversely striated, the striæ numerous and punctated; the spire conical, step-like; the whorls rather convex, the last inflated; the aperture is an elongated ellipse, narrow above and beneath.

The Yorkshire specimen, placed at our disposal by Mr. Bean, is much compressed and imperfect, and has the spire somewhat less elevated than the following species, which resembles one figured by M. Deslongchamps from the Inferior Oolite of Les Moutiers, near Bayeux. The species has not been found in the middle or west of England. Longitudinal diameter 5 lines, transverse 3 lines.

Locality. Great Oolite near Scarborough.

ACTÆON PULLUS. Plate XV, fig. 11.

? TORNATELLA PULLA, *Koch.* 1837. Nordd. Oolith., p. 33, t. 2, fig. 11.
?? — PULCHELLA, *Deslongchamps.* 1848. Mém. Soc. Linn. de Normandie, viii, pl. 18, figs. 4*a*, 4 *b*. (*striis remotis.*)

A. Testâ ovatâ, spirâ elatâ, subacutâ; anfractibus (6) *convexiusculis, striis transversis numerosis regularibus et punctatis; anfractu ultimo subcylindrico; aperturâ ovatâ.*

Shell ovate, spire elevated, somewhat acute; whorls (6) convex, the last whorl subcylindrical; aperture ovate; the surface with numerous regular punctated encircling striæ.

As compared with *A. Sedgvici*, of which it may prove to be only a variety, this is much more elongated, the length of the aperture but very slightly exceeding half of the entire length of the shell; the volutions are convex, and of moderate breadth; the base is rounded, but narrow. Length $3\frac{1}{2}$ lines, transverse diameter 2 lines.

Locality. Great Oolite of Scarborough. It has not been found in the middle or west of England.

ACTÆONINA, *D'Orbigny.*

ACTÆONINA GIGANTEA, *Desl.* sp. Plate XV, fig. 13.

TORNATELLA GIGANTEA, *Deslongchamps.* 1842. Mém. Soc. Lin. de Normandie, vol. vii, pl. 10, figs. 27, 28.
ACTEONINA DESLONGCHAMPSII, *D'Orb.* 1850. Prod. Paléont., p. 299.

A. Testâ ovato-turritâ, spirâ elatâ, apice acuto; anfractibus subplanis, supernè rotundatis; aperturâ angustâ, basi dilatatâ; columellâ ad basin marginatâ.

Shell ovate, turreted; spire elevated, acute; whorls rather flattened at their sides, but rounded above; aperture narrow above, dilated below; columella marginated at its base.

The specimen forwarded to us from Yorkshire is only a cast, but there is no doubt of its identity with the Normandy species, which is from the Great Oolite of Ranville. It likewise occurs in the upper beds of the Inferior Oolite near Minchinhampton. Length 21 lines, breadth 10 lines; the aperture is about three fifths of the entire length of the shell.

Locality. Bath Oolite near Scarborough.

ACTÆONINA GLABRA, *Phil.* sp. Plate XV, fig. 10.

ACTEON GLABER, *Phil.* 1835. Geol. of York., vol. i, t. 9, fig. 31.
— — *Williamson.* Geol. Trans., 2d Series, vol. v, p. 241.
UTRICULUS — *Brown.* Ill. Foss. Con., p. 101, t. 47, fig. 30.
ACTEONINA GLABRA, *D'Orb.* 1850. Prod. Paléont., p. 264.

A. Testâ subcylindricâ, apice obtuso, spirâ parvâ; anfractibus (5) *angustis, subconvexis; anfractu ultimo cylindrico; aperturâ angustâ, basi effusâ.*

Shell subcylindrical, apex obtuse, spire small, whorls (5) narrow, rather convex; last volution cylindrical; aperture rounded, and expanded beneath.

The spire is very blunt and depressed, the volutions being very narrow, and without the slightest angularity. Length 8 lines, transverse diameter 4 lines.

Locality. Great Oolite near Scarborough. In Gloucestershire it is only found in the Inferior Oolite.

ACTÆONINA TUMIDULA. Plate XV, fig. 14.

A. Testâ parvâ, spirâ exsertiusculâ; anfractibus angustis, rotundatis, suturis depressis; anfractu ultimo subcylindrico; aperturâ elongato-ovatâ.

Shell small, spire depressed, volutions very narrow, rounded, their sutures deeply depressed; the last whorl gibbous; aperture an elongated oval.

This species is shorter than any other of the genus with which we are acquainted. The figure of the last whorl is only moderately cylindrical; and the transverse diameter of this portion is not much less than the entire length of the shell. Length 4½ lines, transverse diameter 3½ lines.

Locality. Near Scarborough.

ANNELLIDA.

VERMICULARIA NODUS, *Phil.* Plate XIV, figs. 8*a*, *b*.

VERMICULARIA NODUS, *Phil.* 1835. Geol. of York., vol. i, p. 124, t. 9, fig. 34.

V. Testâ lævi, in spiram turbinatem convolutâ, anfractibus (3) *convexiusculis; anfractu ultimo ad basin convexo, et lineâ obsoletâ submesâ cincto.*

Shell smooth, forming an obtuse turbinated spire, with three volutions, which are rather convex; the last whorl rounded towards the base, with an obscure encircling line placed a little beneath the middle of the whorl; aperture not exposed.

Locality. Scarborough, Westow, and Whitwell; also in the Cornbrash. (*Phillips.*)

SERPULA PLICATILIS, *Goldf.* Plate XIV, figs. 5*a, b, c.*

SERPULA PLICATILIS, *Goldfuss.* 1833. Petref., p. 229, t. 68, fig. 2.

S. Testâ laxâ vel curvatâ, lateribus subconvexis, læviusculis, costulis arcuatis per paria approximatis; carinâ continuâ rectâ. (Goldf.)

Shell loose or unwound, irregularly curved, slender, rather convex, smooth; the sides have little, obscure, closely-arranged, curved costæ, not visible upon the majority of specimens; the dorsal carina is simple, continuous, but not much elevated or conspicuous.

This minute species was gregareous, a considerable number being clustered upon a small *Pecten.*

Locality. Scarborough.

SERPULA SULCATA, *Sow.* Plate XIV, fig. 6.

SERPULA SULCATA, *Sow.* 1829. Min. Con., t. 608, figs. 1, 2.

S. Testâ sublaxâ aut curvatâ, lævi, subcarinatâ; carinâ dorsali lævigatâ; sulcisque angustis carinæ approximatis; lateribus subplanis.

Shell partially unrolled, curved, smooth; dorsal carina smooth, with a narrow sulcus on each side of it; sides of the shell rather flattened; lines of growth visible upon different portions of the surface.

The mode of growth in this species appears to have been very irregular. In its young state it was flattened at the sides, but subsequently became much more rounded; and the figure of the aperture is nearly orbicular.

Locality. Scarborough. Inferior Oolite near Stroud.

SERPULA INTESTINALIS, *Phil.* Plate XIV, fig. 7.

SERPULA INTESTINALIS, *Phil.* 1835. Geol. of York., vol. i, p. 110, t. 5, fig. 21.

S. Testâ sublaxâ, lævi, compressiusculâ, sulco læviter depresso, supernè et infernè sitâ.

Shell smooth, partially unrolled, somewhat compressed above and beneath with a slight longitudinal sulcus in the middle of the two flattened sides.

This species is destitute of a carina, nor are any lines of growth visible; the sulcations are only to be seen upon the unrolled portion of the shell.

Locality. Bath Oolite, Scarborough; also in Oxford Clay and Cornbrash. (*Phillips.*)

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CORRIGENDA.

Page 1. Line 18, for *Hailsworth* read *Nailsworth.*

„ 2. In foot-note, line 6, for *Nuns* read *Nunnery.*

„ 3. Line 26, after Gresslya, erase the word *or*, and place a ,.

„ 4. Line 33, for *Pterocera* read *Alaria.*

„ 8 and 9. *The two Belemnites occur also at Minchinhampton.*

„ 16. To the last line add, *wing simple, undivided.*

Page 49. Chemnitzia Lonsdalii, *Plate VIII*, read *Plate VII.*

„ 62. Trochus squamiger, *Plate X, figs.* 2, 2*a*, 2*b*, read *Plate IX, figs.* 34, 34*a.*

„ 86. Line 26, for *with*, read *to.*

„ 96. Line 24, for *Loliolum* read *doliolum.*

„ 99. Line 8, after "remaining species," read *to the species of section B.*

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[I. O., *or* C-b., *affixed, shows that the species also occurs in the Inferior Oolite, or Cornbrash.*]

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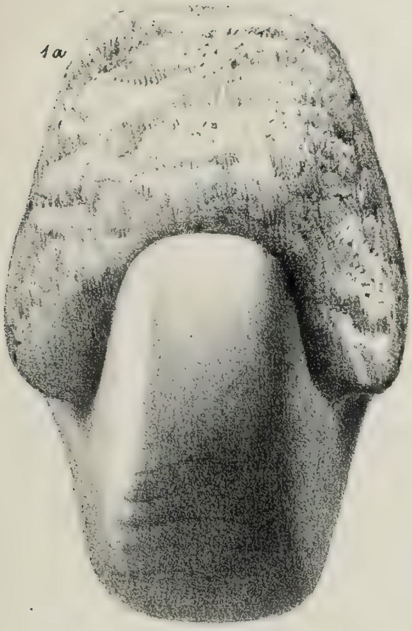
Lyellii . . . 67
obtusus . . . 66
subobtusus . . . 66
TURRITELLA
Roissii . . . 32
UTRICULUS
glaber . . 120

PLATE I.

Fig.

1. Nautilus Baberi, *p.* 10, side view.
1*a*. — — front view.
2. Nautilus subtruncatus, *p.* 10, side view.
2*a*. — — front view.
3. Ammonites gracilis, *p.* 12, young; and *p.* 105, Plate XIII, figs. 2, 2*a*, adult.
4. Ammonites Waterhousei, *p.* 13, side view.
4*a*. — — front view.
5. Belemnites Bessinus, *p.* 8.
7. — — showing the phragmacone.
6, 8. Belemnites fusiformis, *p.* 8.

1a



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5

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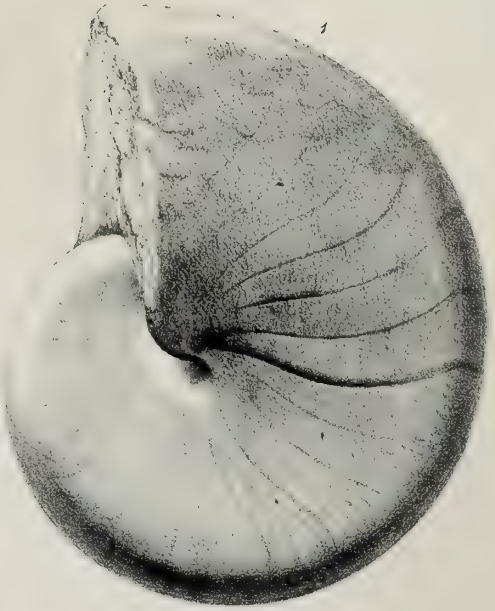

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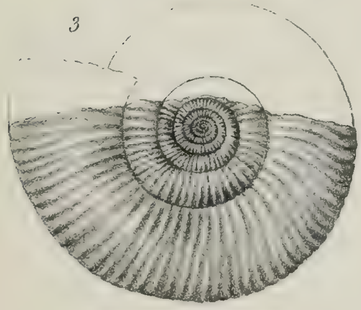

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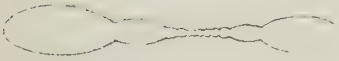
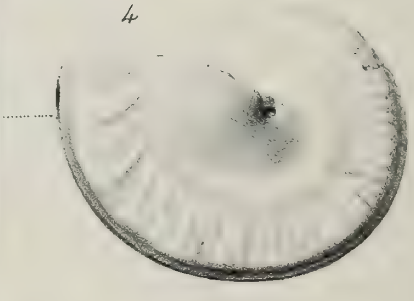


3a

7

4a

4



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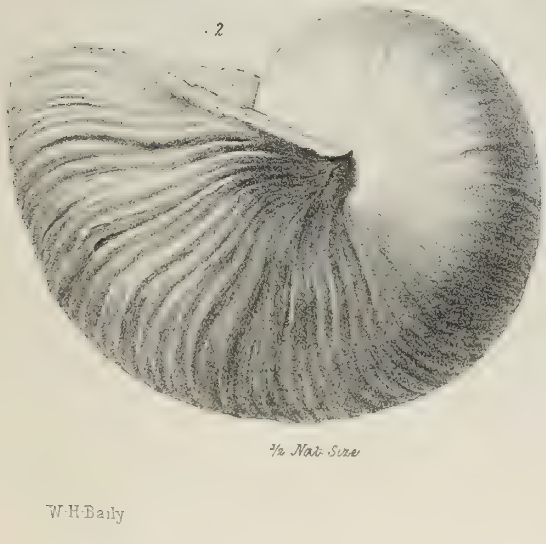

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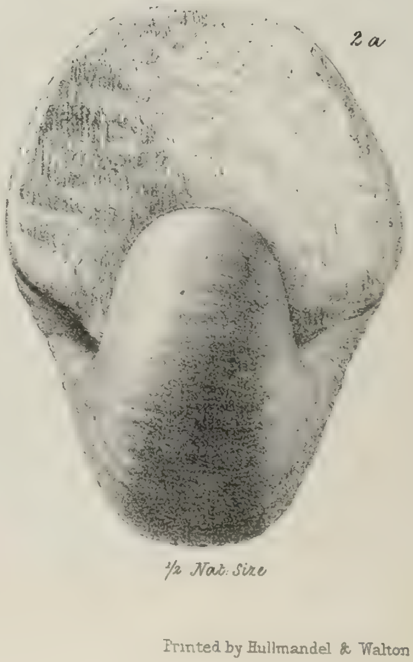
2a



½ Nat. Size

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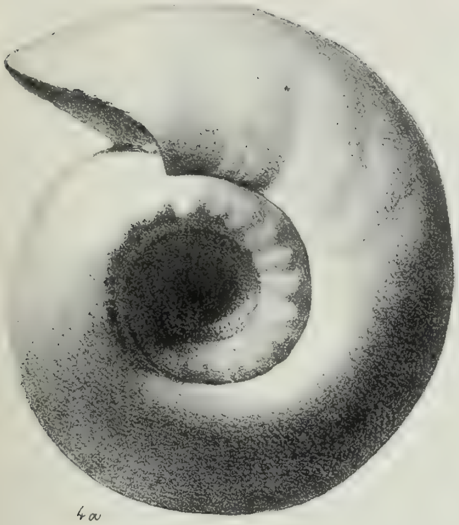
PLATE II.

Fig.

1. Ammonites subcontractus, *p.* 11, side view.
1*a*. — — front view.
2, 2*a*. — — young of.
3. Ammonites macrocephalus, var., *p.* 12, side view.
3*a*. — — front view.
4. Ammonites arbustigerus, *p.* 12, side view.
4*a*. — — front view.
5. Nautilus dispansus, *p.* 9, side view.
5*a*. — — front view.

1



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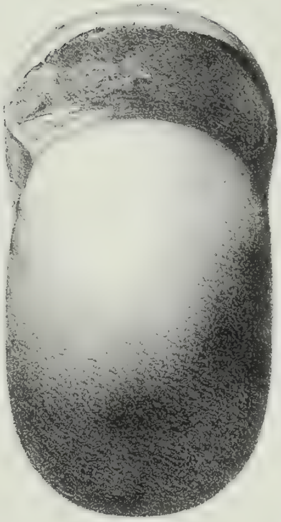

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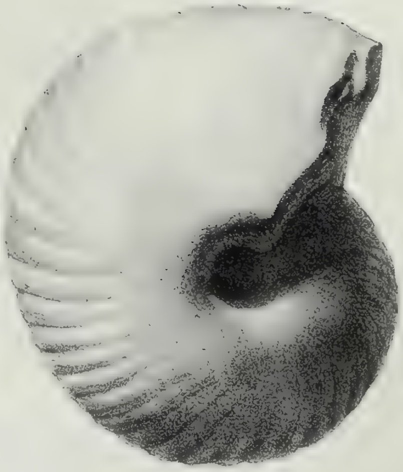

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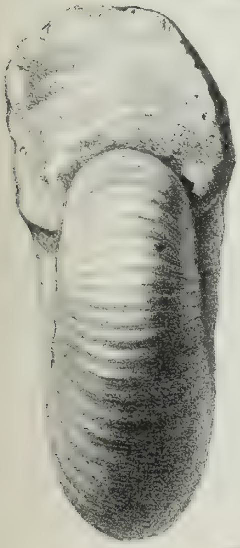

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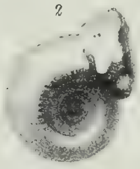

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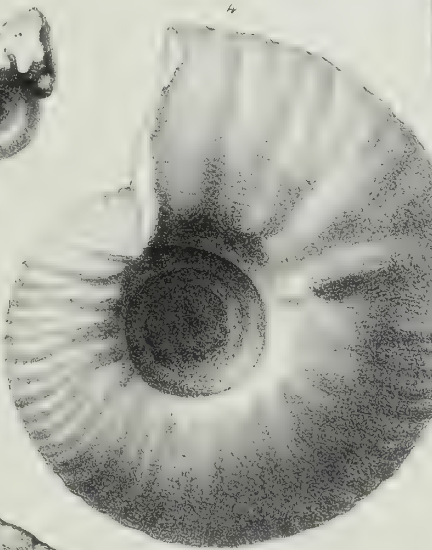
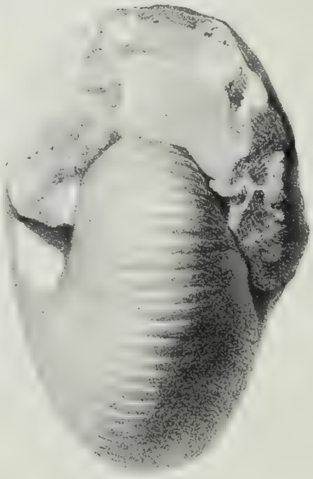


2a

3a



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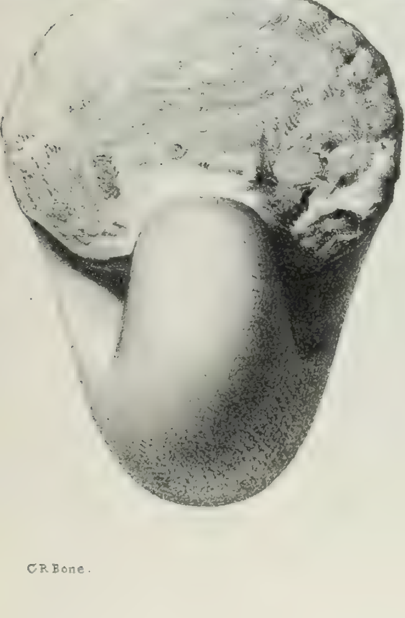

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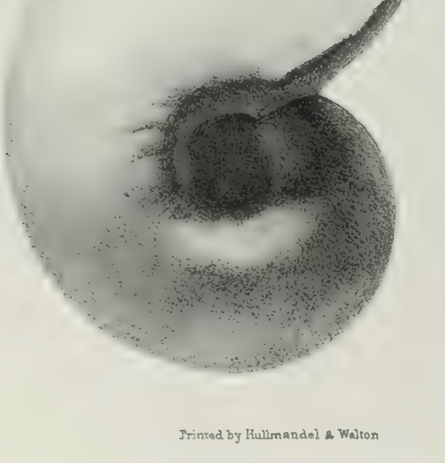

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PLATE III.

Fig.	
1, 1*a*, *c*.	Alaria armata, *p.* 16, back view.
1*b*.	— — front view; *d*, portion magnified.
2.	Alaria hamus, *p.* 16.
2*a*.	— — portion magnified.
2*b*.	— — front view.
3, 3*a*.	Alaria lævigata, *p.* 17.
4, 4*b*.	Alaria hamulus, *p.* 17, back view.
4*a*.	— — specimen magnified.
5.	Alaria Phillipsii, *p.* 18; and *p.* 111, Plate XV, figs. 15, 15*a*.
5*a*.	— — portion magnified.
6.	Alaria pagoda, *p.* 18; and Plate XIII, figs. 4, 4*a*.
7, 7*a*.	Alaria atractoides, *p.* 19.
8.	Alaria hexagona, *p.* 19.
9.	Alaria paradoxa, *p.* 20, front view; and Plate XIII, fig. 3.
9*a*.	— — var. *a*, back view.
10.	— — back view.
11, 11*b*.	Alaria trifida, *p.* 21, front view.
11*a*.	— — back view.
11*c*.	— — portion magnified.
12*a*.	Alaria parvula, *p.* 22.
12*b*.	— — magnified.
13, 13*a*.	Alaria cirrus, *p.* 22.
14.	Pteroceras ignobilis, *p.* 14.
15.	— Bentleyi, *p.* 15, front view.
15.	— — back view.
16.	— — var. of, back view.

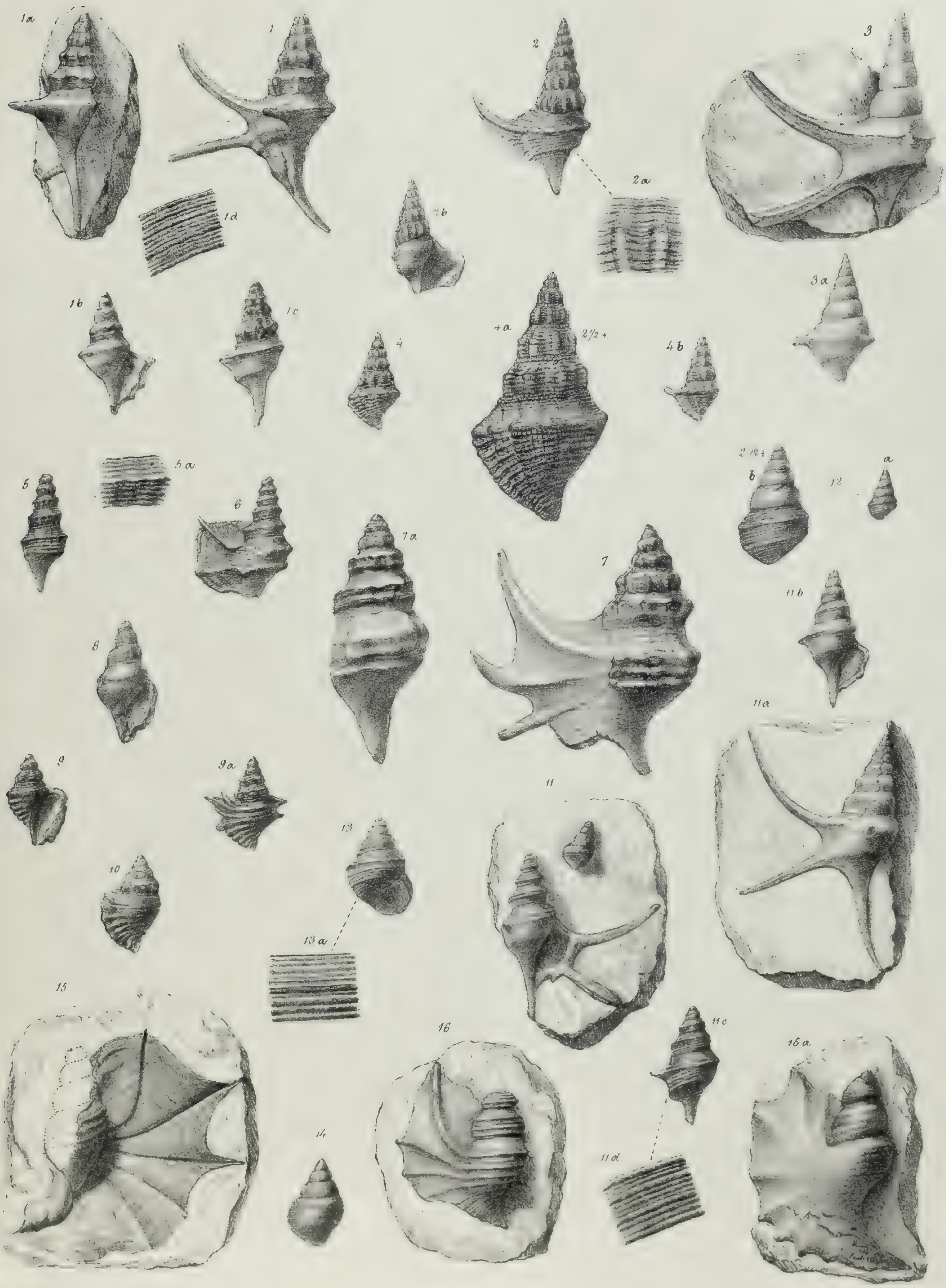

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PLATE IV.

Fig.

1. Purpuroidea Moreausia, *p.* 27, front view.

1*a*. — — back view.

2. — — back view, shell of advanced growth, larger specimen.

3. — — young shell, front view.

3*a*. — — young shell, back view.

4. — — cast of the interior.

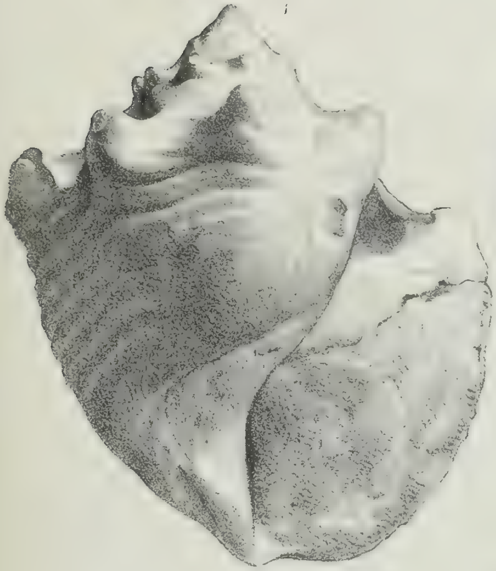
5. Purpuroidea glabra, *p.* 28, front view.

5*a*. — — back view.

6. — — young shell, front view.

6*a*. — — young shell, back view.

1



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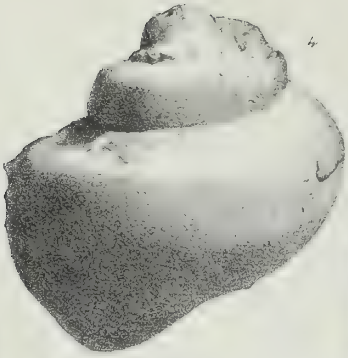

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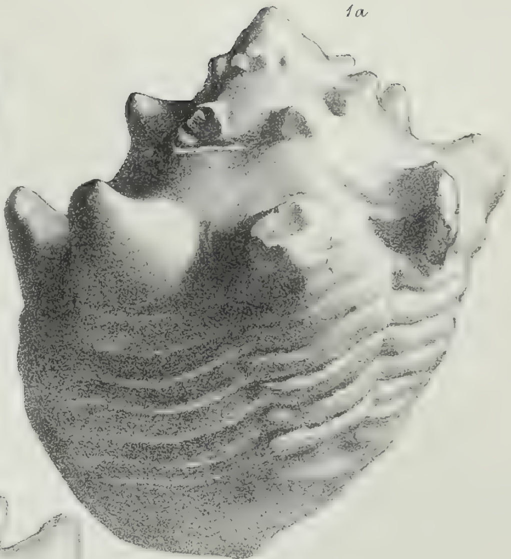

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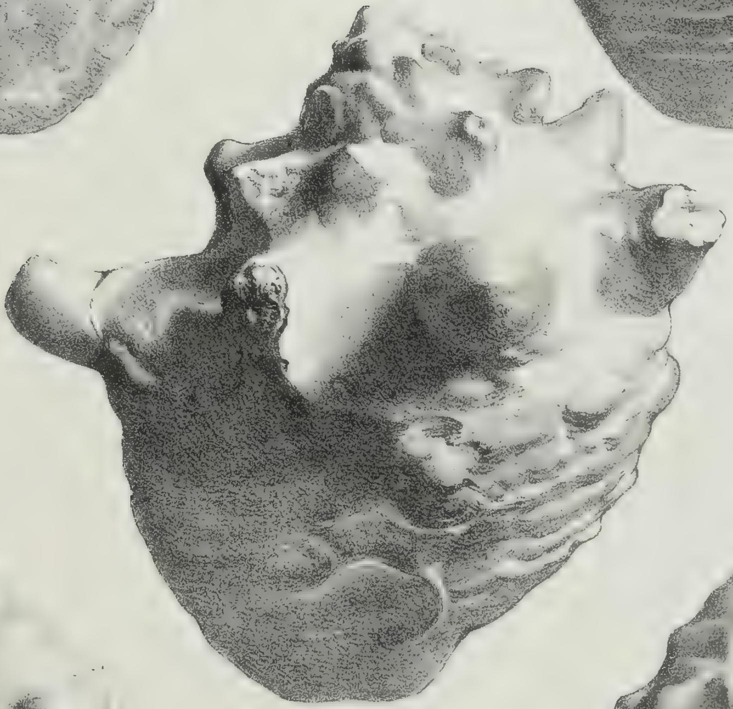

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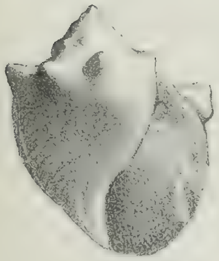
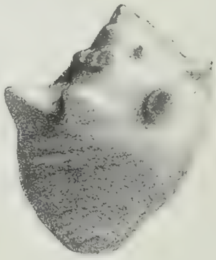
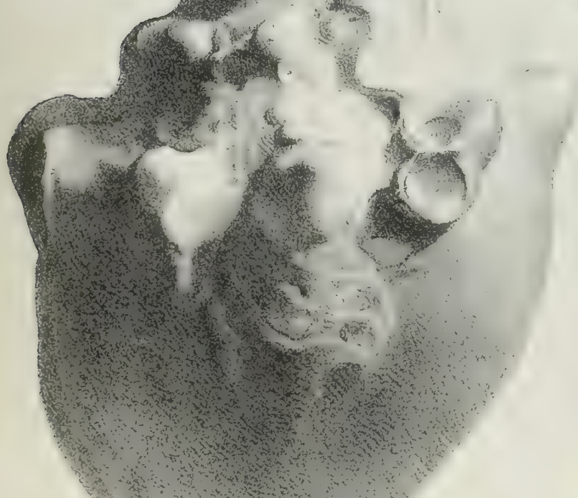


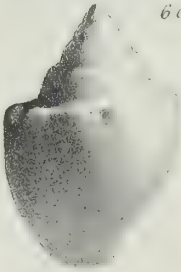
3a



5a



6a



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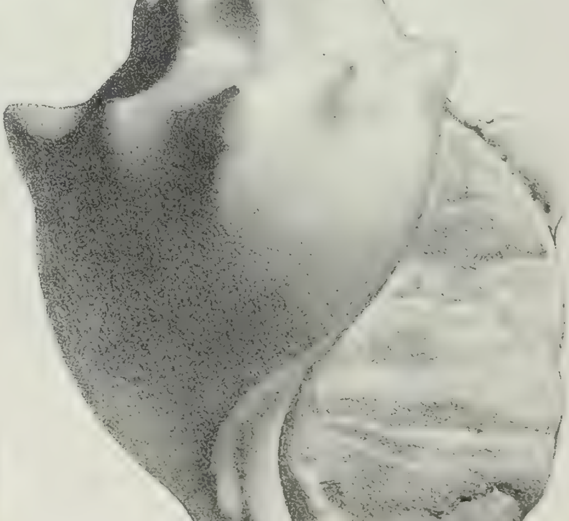

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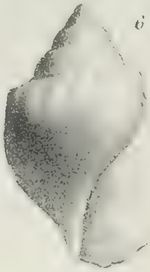

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PLATE V.

Fig.
1. Purpuroidea nodulata, *p*. 28, front view.
1*a*. — — back view.
2. — — another example.
3. — — young shell, front view.
4. — — cast of the interior.
5. Fusus coronatus, *p*. 23.
6. Fusus multicostatus, *p*. 23.
7. Fusus (Brachytrema) Buvignieri, *p*. 24.
8. Delphinula Buckmani, *p*. 71.
9. Fusus subnodulosus, *p*. 23.
9*a*. — — portion enlarged.
10. Ceritella conica, *p*. 39, front view.
10*a*. — — back view.
10*b*. — — smaller example.
10*c*. — — magnified twice.
11. Actæonina parvula, *p*. 104, front view.
11*a*. — — back view.
12. — — younger example.
12*a*. — — adult, magnified twice.
13. Ceritella unilineata, *p*. 38, and Plate XIII, fig. 8, Plate IX, fig. 15, *var*.
14. Ceritella planata, *p*. 38, natural size.
14*a*. — — magnified three times.
15. Ceritella mitralis, *p*. 39.
16. Ceritella Sowerbii, *p*. 38.
17. Ceritella acuta, *p*. 37, young, front view.
17*a*. — — young, back view.
18. — — adult, front view.
18*a*. — — adult, back view.
19. Pagodus (Amberlya) nodosa, *p*. 55.

Pl. 7

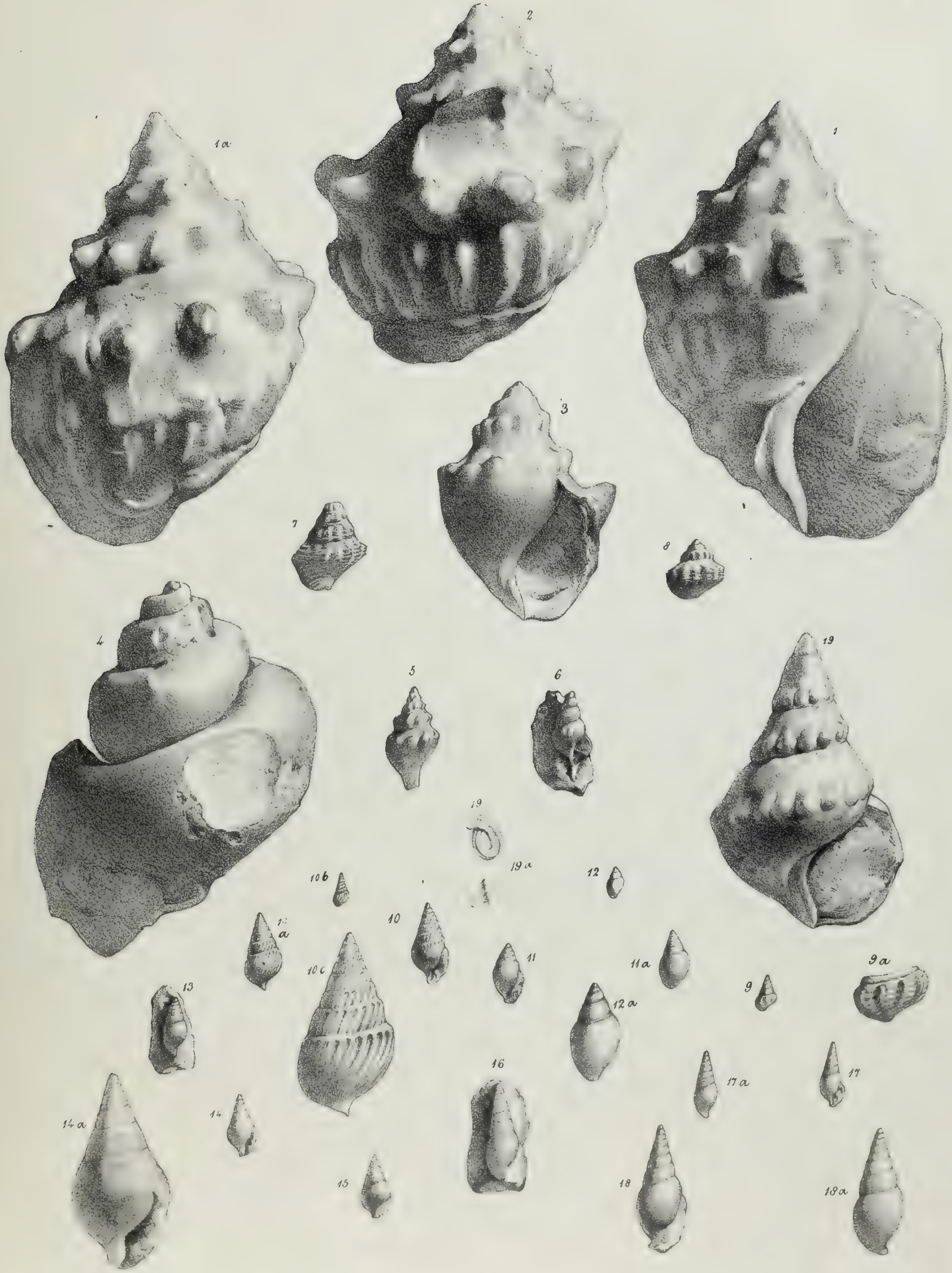

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PLATE VI.

Fig.
1. Natica intermedia, *p.* 41, front view.
1*a*. — — back view.
2. Natica Michelini, *p.* 44, front view, elongated variety.
2*a*. — — back view, elongated variety.
3. — — another example, front view.
3*a*. — — another example, back view.
4. Natica neritoidea, *p.* 43.
5. — ambigua, *p.* 44.
6. — Verneuili, *p.* 44, front view.
6*a*. — — back view.
7. — — young shell, front view.
7*a*. — — young shell, back view.
8. Natica (Euspira) pyramidata, *p.* 46, front view.
8*a*. — — — back view.
9. Natica (Euspira) coronata, *p.* 46.
10. — formosa, *p.* 42.
11. — Tancredi, *p.* 42.
12. — grandis, *p.* 41.
13. Natica (Euspira) subcanaliculata, *p.* 47.
14. Natica globosa, *p.* 43.

Pl. VI

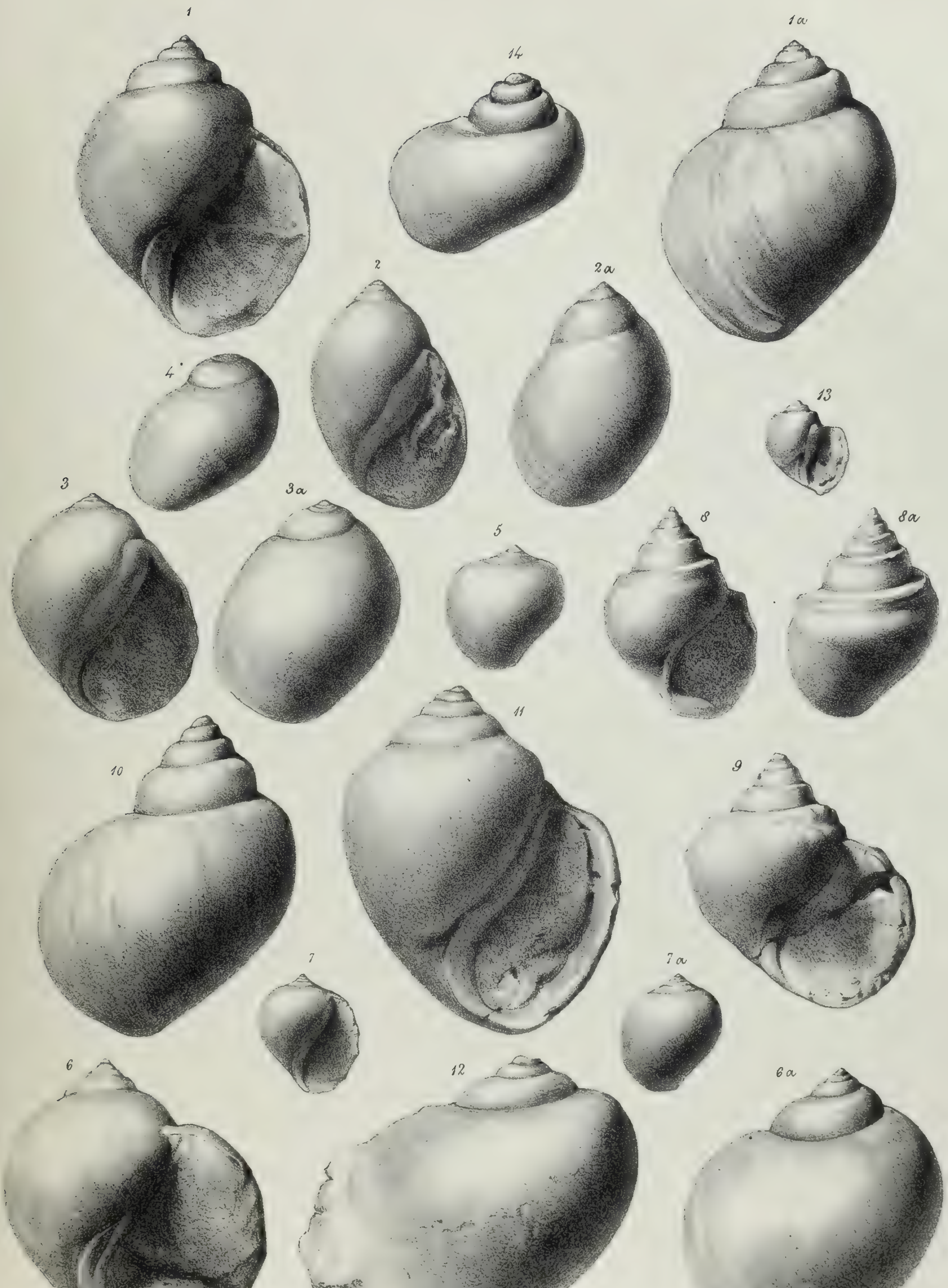

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PLATE VII.

Fig.	
1.	Chemnitzia Hamptonensis, *p.* 50.
1*a.*	— — magnified.
2.	Cerithium limæforme, *p.* 30.
3.	— sexcostatum, *p.* 30.
3*a*	— — magnified.
4.	Chemnitzia Leckenbyi, *p.* 50, magnified.
5.	— Wetherellii, *p.* 50.
5*a.*	— — magnified.
6.	Nerinæa Eudesii, *p.* 33.
6*a.*	— — magnified.
7.	Nerinæa Voltzii, *p.* 32, young.
7*a.*	— — section magnified.
8.	Nerinæa Dufrenoyi, *p.* 34.
8*a.*	— — magnified.
8*b.*	— — section magnified.
8*c*, 8*e.*	— — *p.* 34, another variety.
8*d.*	— — portion magnified.
9.	Nerinæa Stricklandi, *p.* 35
9*a.*	— — portion magnified.
10, 10*c.*	Nerinæa punctata, *p.* 35.
10*a.*	— — portion of external surface magnified.
10*b.*	— — section magnified.
11.	Nerinæa Voltzii, *p.* 32.
11*a.*	— — section.
12.	Nerinæa funiculis, *p.* 36.
12*a.*	— — portion of the surface magnified.
12*b.*	— — section magnified.
13.	Chemnitzia Lonsdalei, *p.* 49, the young shell.
13*a.*	— — the adult shell.
14.	Cerithium Roissii, *p.* 32.
14*a.*	— — section of the shell.
15.	Chemnitzia simplex, *p.* 49, reduced one half.

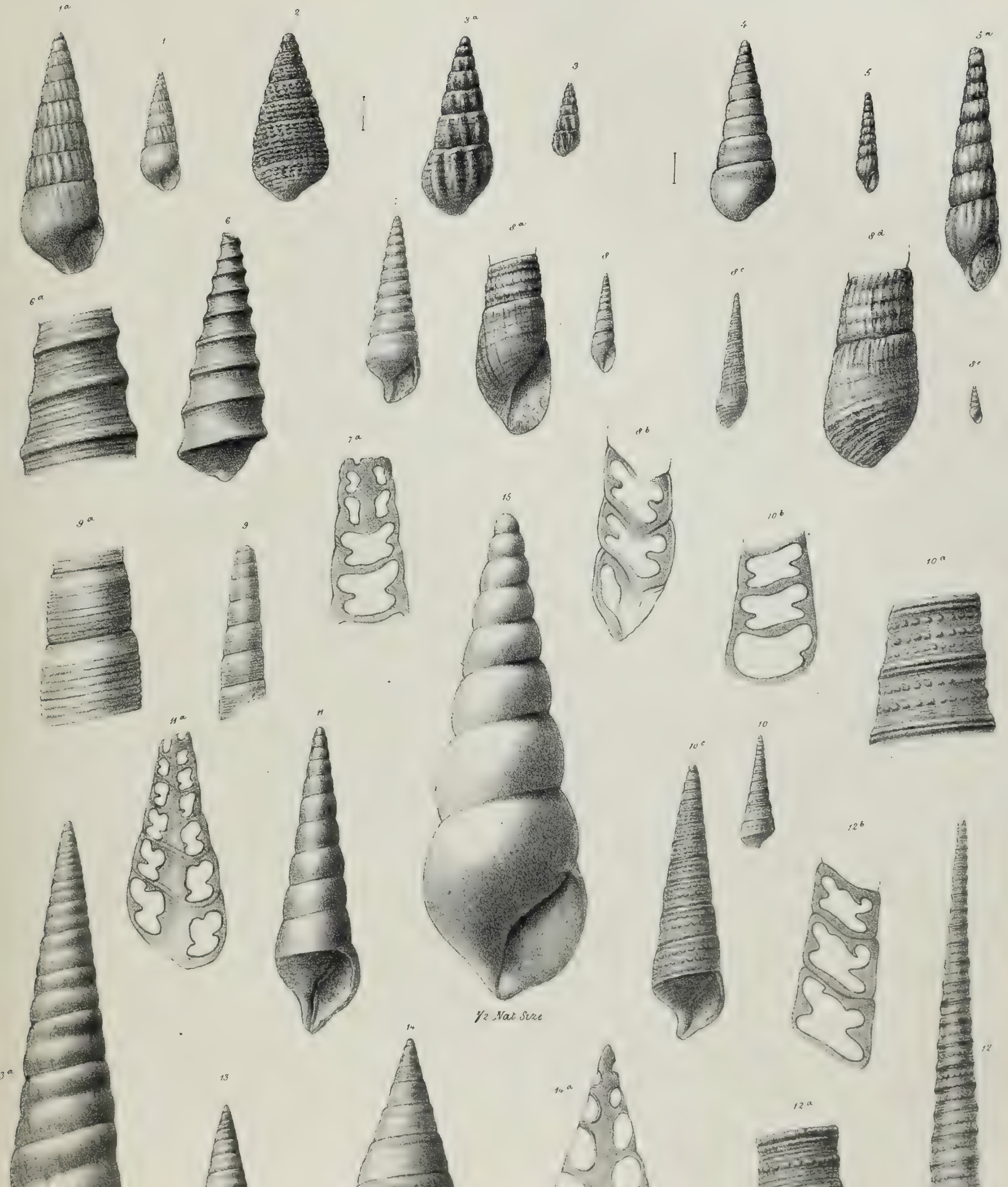

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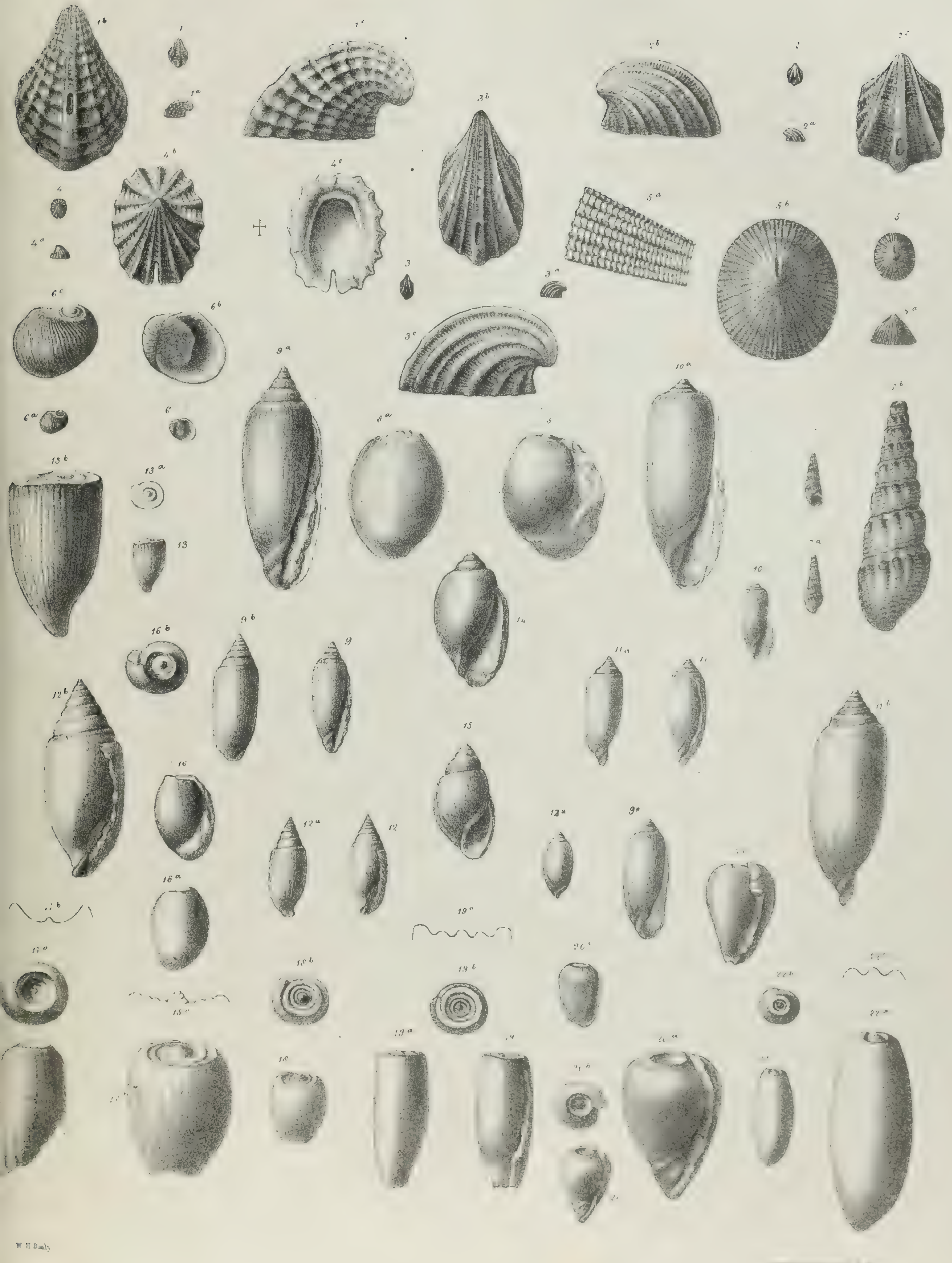
PLATE VIII.

Fig.	
1, 1*a*.	Rimula clathrata, *p*. 86.
1*b*, 1*c*.	— — magnified.
2, 2*a*.	Rimula tricarinata, *p*. 86.
2*b*, 2*c*.	— — magnified.
3, 3*a*.	Rimula Blotii, *p*. 87.
3*b*, 3*c*.	— — magnified.
4, 4*a*, 4*b*.	Emarginula scalaris, *p*. 88.
4*c*.	— — under surface magnified.
5, 5*a*.	Fissurella acuta, *p*. 85.
5*b*, 5*c*.	— — specimen magnified.
6, 6*a*.	Nerita costulata, *p*. 57.
6*b*, *c*.	— — specimen magnified.
7, 7*a*.	Chemnitzia variabilis, *p*. 51.
7*b*.	— — magnified.
8, 8*a*.	Bulla undulata, *p*. 96.
9, 9*b*.	Cylindrites acutus, *p*. 98.
9*a*.	— — magnified.
10.	Cylindrites cuspidatus, *p*. 98.
10*a*.	— — magnified.
11, 11*a*.	Cylindrites angulatus, *p*. 99.
11*b*.	— — magnified.
12, 12*a*.	Cylindrites altus, *p*. 99.
12*b*.	— — magnified.
12*.	Actæonina ?
13, 13*a*.	Cylindrites brevis, *p*. 101.
13*b*.	— — magnified.
14.	Actæonina olivæformis, *p*. 103.
15.	Actæonina bulimoides, *p*. 104.
16, 16*a*, 16*b*.	Bulla loliolum, *p*. 96.
17, 17*a*.	Cylindrites excavatus, *p*. 100.
17*b*.	— — magnified section.
18, 18*b*.	Cylindrites bullatus, *p*. 102.
18*a*, 18*c*.	— — magnified.
19, 19*a*.	Cylindritescylindricus, *p*. 100.
19*b*, *c*.	— — view of apex, and section of the same.
20, 20*b*, 20*c*, 21.	Cylindrites pyriformis, *p*. 102.
20*a*.	— — magnified.
22, 22*b*.	Cylindrites Thorenti, *p*. 101.
22*a*, 22*c*.	— — magnified.


1b
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1c
2b
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2c
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3c
6c
6b
9a
10a
6a
6
8a
8
13b
13a
13
10
14
16b
9b
9
11a
11
12b
15
16
12a
12
13*
9*
16a
19c
18b
19b
18c
19a
18
22a

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PLATE IX.

Fig.	
1.	Eulima pygmæa, *p*. 48.
2.	Phasianella acutiuscula, *p*. 75, and Plate XI, fig. 28.
3, 4.	Eulima vagans, *p*. 48.
5.	Chemnitzia phasianoides, p. 51.
6.	Eulima subglobosa, *p*. 49.
7.	Ceritella rissoides, *p*. 40.
8.	Cerithium quadricinctum, *p*. 29.
9.	Rissoina acuta, *p*. 53, and Plate XIII, fig. 9.
10.	Rissoina duplicata, *p*. 52.
12, 12*a*.	Rissoina cancellata, *p*. 53.
13.	Rissoina tricarinata, *p*. 53.
14.	Ceritella longiscata, *p*. 40.
15.	Ceritella unilineata, ? from Ancliff, p. 38.
16.	Rissoina ? lævis, *p*. 54.
17.	Ceritella gibbosa, *p*. 37.
18.	Cerithium strangulatum, *p*. 31.
18*a*.	— — showing the contracted aperture.
19.	Rissoina obliquata, *p*. 52.
20.	Cerithium Tennanti, *p*. 32.
21.	Eulima communis, *p*. 48, front view.
21*a*.	— — back view.
22.	Cerithium pentagonum, *p*. 30.
23.	Solarium varicosum, *p*. 69.
23*a*.	— — view of the base.
23*b*.	— — surface magnified.
24, 24*a*, *b*.	Solarium polygonium, *p*. 69.
25, 25*a*, *b*.	Solarium disculum, *p*. 70.
26.	Delphinula coronata, *p*. 70.
27.	Turbo elaboratus, *p*. 64.
28.	Turbo Sharpei, *p*. 65,
28*a*.	— — surface magnified.
29.	Turbo pygmæa, *p*. 65.
29*a*.	— — magnified view.
30, 30*a*.	Turbo Hamptonensis, *p*. 64.
30*b*.	— — magnified view.
31.	Delphinula alta, *p*. 71.
32.	Stomatia ? Buvignieri, *p*. 85.
32*a*.	— — surface magnified.
33, 33*a*.	Turbo capitaneus, *p*. 65.
34.	Trochus squamiger, *p*. 62,* and Plate XIII, fig. 7.
34*a*.	— — back view.
35.	Fusus (Brachytrema) turbiniformis, *p*. 25.
35*a*.	— — — front view.
36, 36*a*.	Pileolus plicatus, *p*. 60.
36*b*.	— — view of the base and aperture magnified.
36*c*.	— — side view magnified.
37, 37*a*.	Pileolus lævis, *p*. 60.
37*b*.	— — view of the base and aperture magnified.

* *Incorrectly printed as* Plate X, figs. 2, 2*a*, *b*.

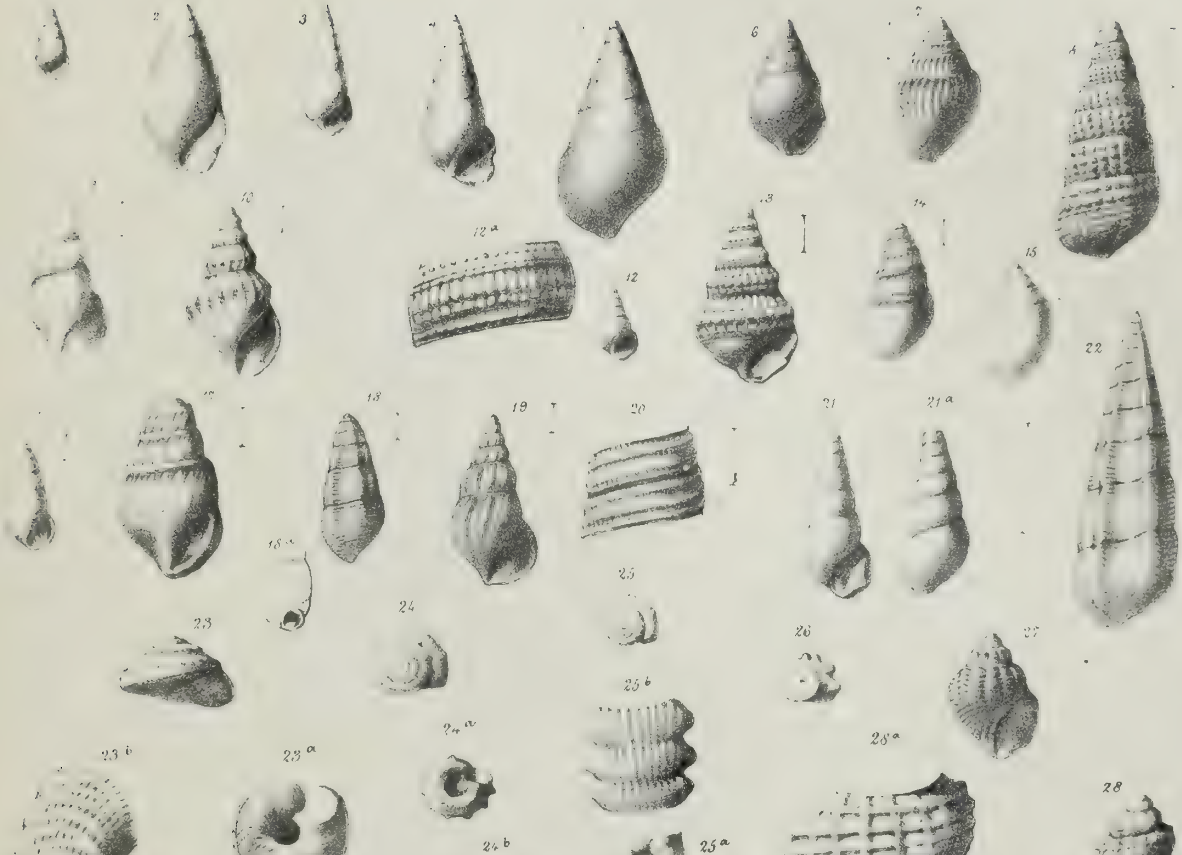

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PLATE X.

Fig.
1. Trochus Bunburyi, *p.* 63.
1*a*. — — magnified three times.
1*b*. — — back view.
2. Trochus spiratus ? *var.*, *p.* 106, and Plate XIII, fig. 6.
2*a*. — magnified.
2*b*. — front view.
3. Trochus Dunkeri, *p.* 61.
3*a*. — — magnified.
4. Trochus Ibbetsoni, *p.* 62.
4*a*. — — magnified.
5. Trochus pileolus, *p.* 63.
5*a*. — — magnified.
5*b*. — — another example.
6. Pleurotomaria clathrata, *p.* 79.
6*a*. — — magnified three times.
7. Trochus anceus, *p.* 63.
7*a*. — — specimen magnified.
8. Trochus plicatus, *p.* 61.
8*a*. — — magnified.
9. Pleurotomaria pagodus, *p.* 77.
10. Trochotoma discoidea, *p.* 84, upper surface.
10*a*. — — magnified.
10*b*. — — side view.
10*c*. — — costæ magnified.
11. Pleurotomaria obesa, *p.* 79.
12. Pleurotomaria discoidea, *p.* 78.
13. Pleurotomaria composita, *p.* 80.
13*a*. — — portion magnified.
14. Pleurotomaria scalaris, *p.* 77.
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15*b*. — — back view.
16. Trochotoma conuloides, *p.* 82.
17. Trochotoma tabulata, *p.* 83.
17*a*. — — front view.
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18*b*. — — surface magnified.
19*a*. Trochotoma extensa, *p.* 83.
19*b*. — — back view.
20. Trochotoma acuminata, *p.* 82.

IIX

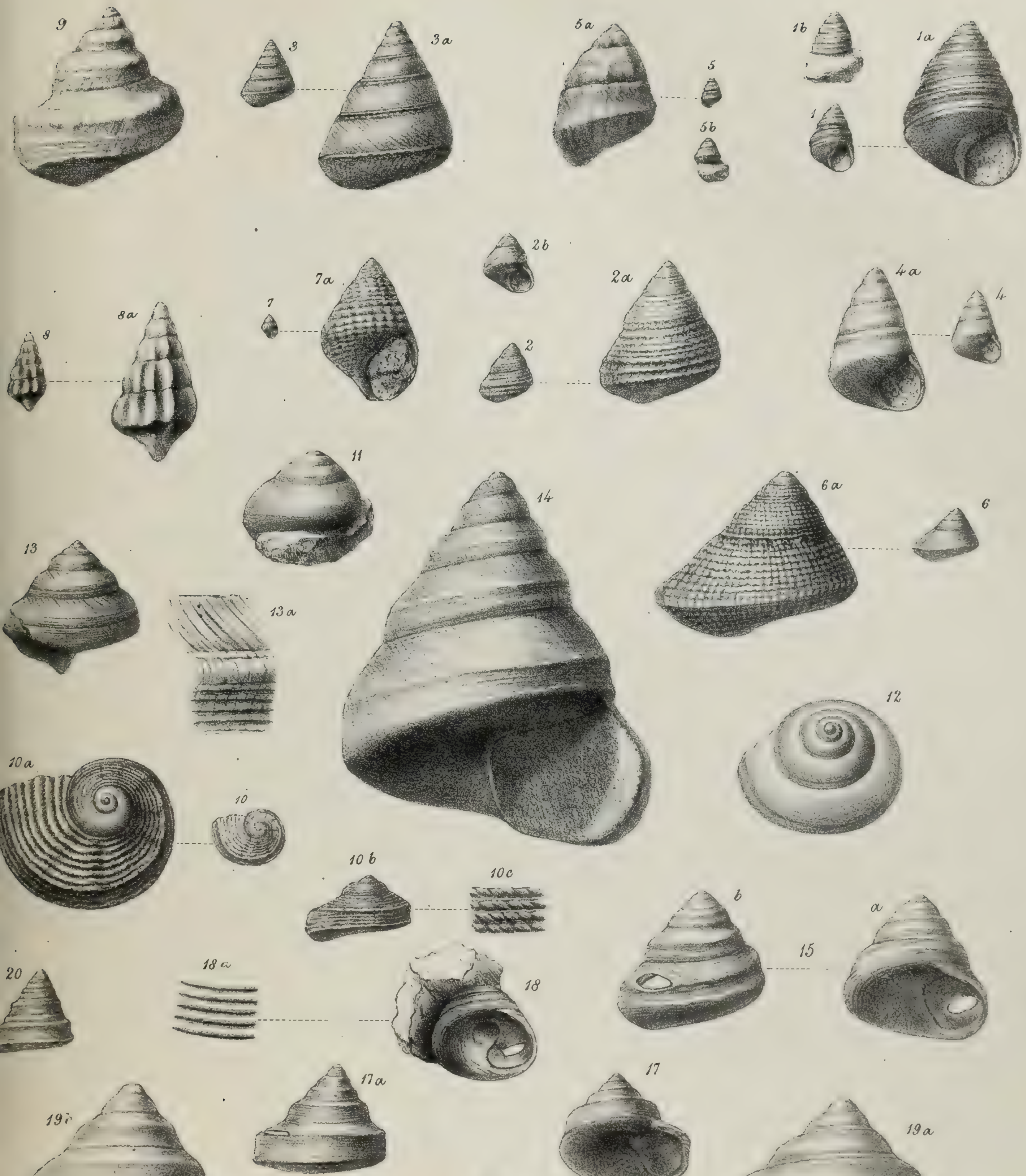

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PLATE XI.

Fig.	
1.	Trochus obsoletus, *p.* 63.
1*a.*	— — magnified view.
2.	Monodonta Labadyei, *p.* 68.
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30, 30*a.*	Phasianella conica, *p.* 74.
31, 31*a.*	Phasianella Leymeriei, *p.* 74.
32.	— — a globose variety.

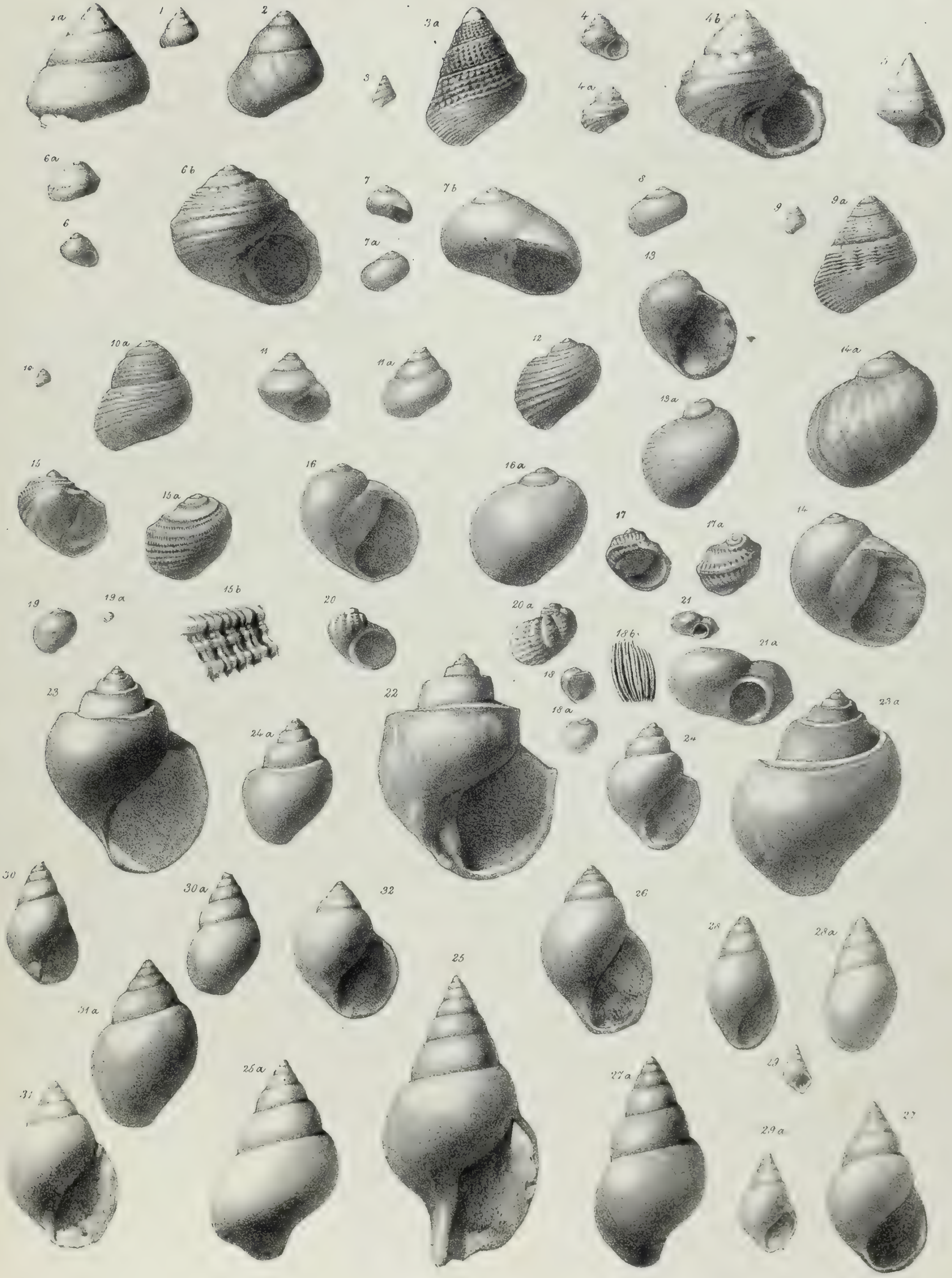

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PLATE XII.

Fig.		
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1*b*.	— —	magnified portion of the surface of figs. 1, 1*a*.
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1*e*.	— —	magnified portion of the surface of figs. 1*c*, 1*d*.
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13, 13*a*.	Deslongchampsia Eugenei, *p*. 94,	magnified twice.

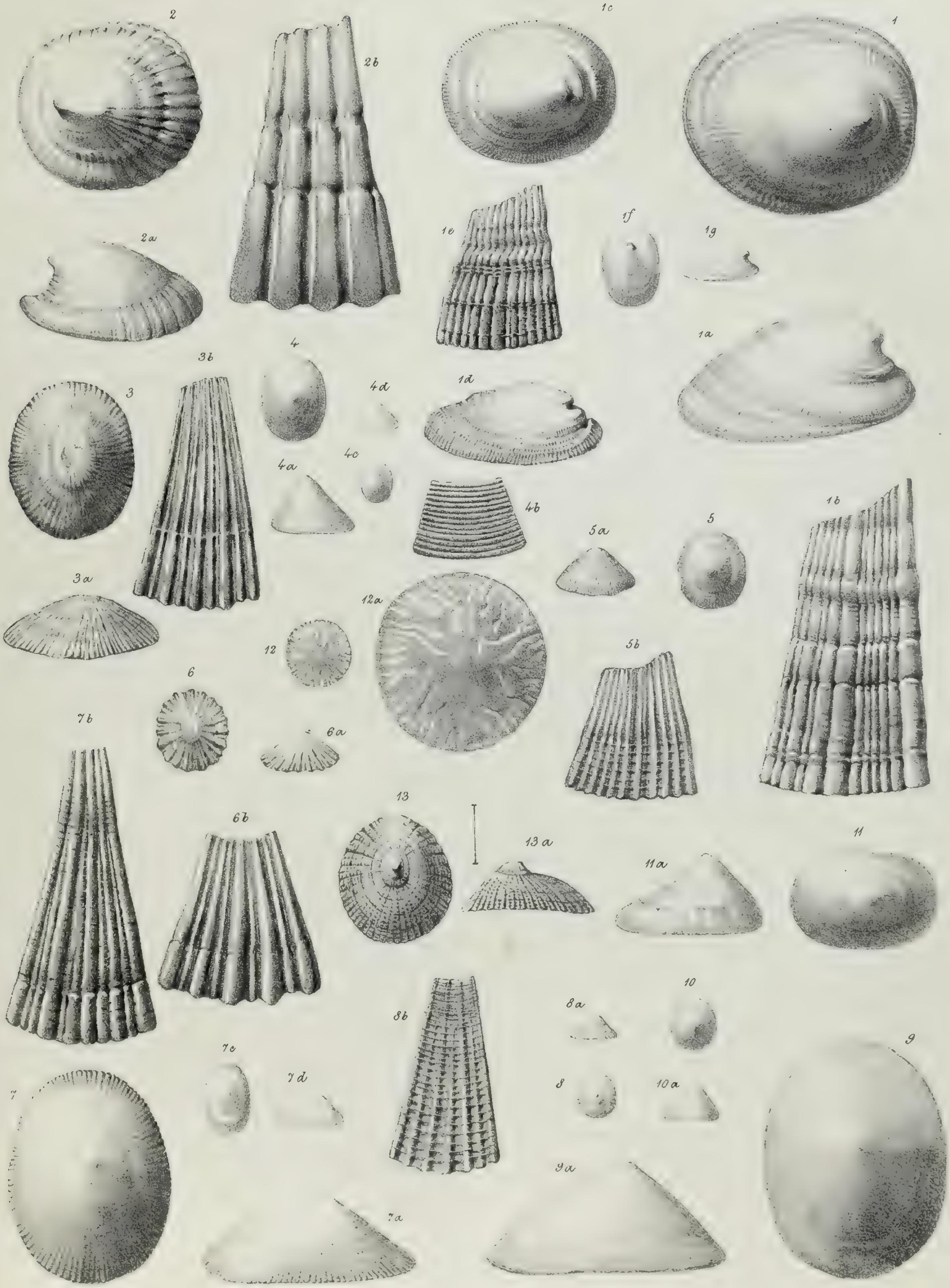

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PLATE XIII.

Fig.

1. Pteroceras Wrightii, *p*. 105. (In Dr. Wright's collection.)
2. Ammonites gracilis, and Plate I, fig. 3, *pp*. 12 and 105.
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8. Ceritella unilineata, and Plate V, fig. 13, *p*. 38.
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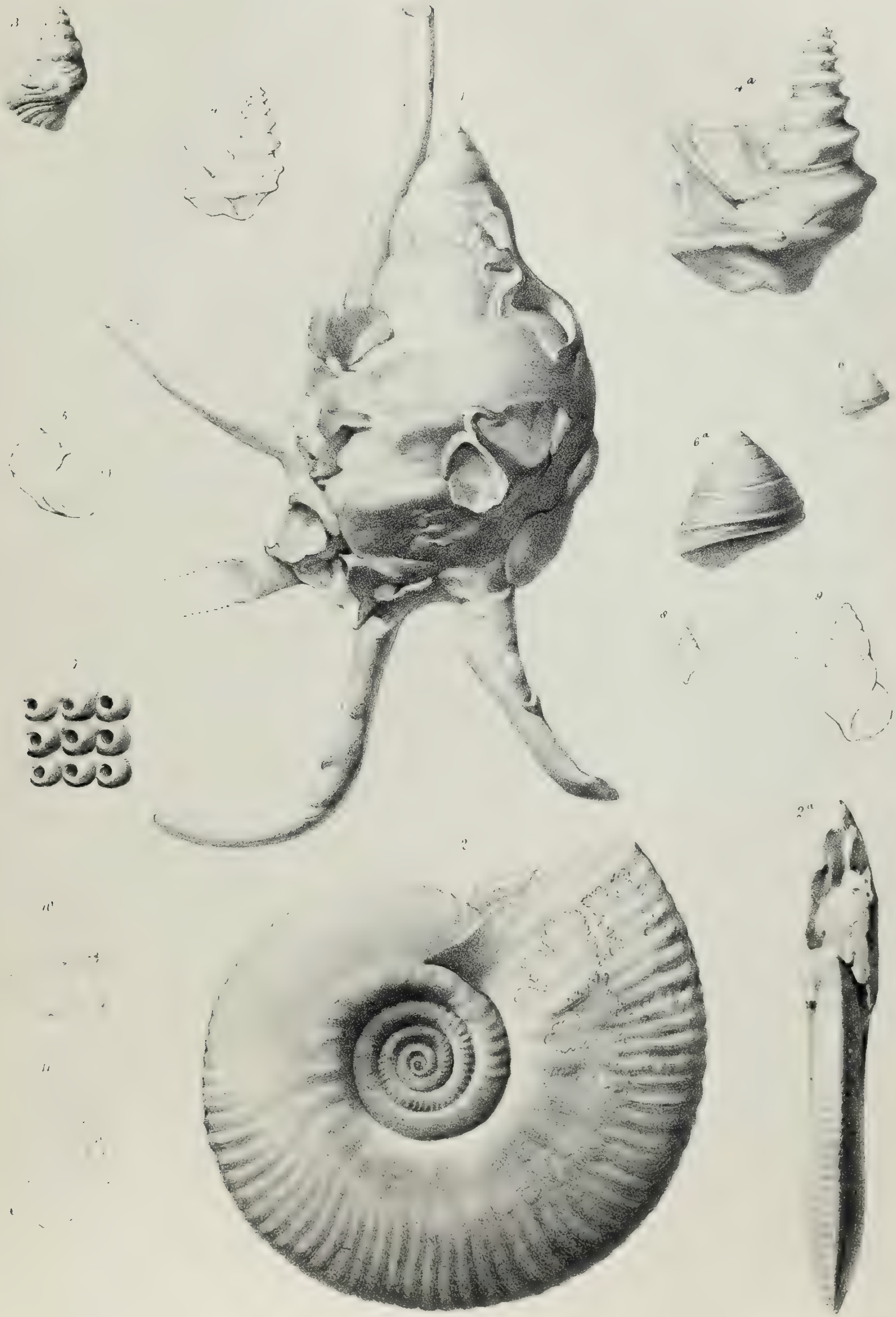
10. Nerinea Eudesii, and Plate VII, fig. 6, *p*. 33. Section of interior.
11. Nerinea Voltzii, and Plate VII, fig. 11, *p*. 32. Section of interior.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11

PLATE XIV.

YORKSHIRE SHELLS.

Fig.

1. Ammonites Braikenridgii, *p.* 111, reduced one half.
2. Ammonites macrocephalus, *p.* 109, reduced one half.
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6. Serpula sulcata, *p.* 121.
7. Serpula intestinalis, *p.* 121.
8*a*, *b*. Vermicularia nodus, *p.* 120.

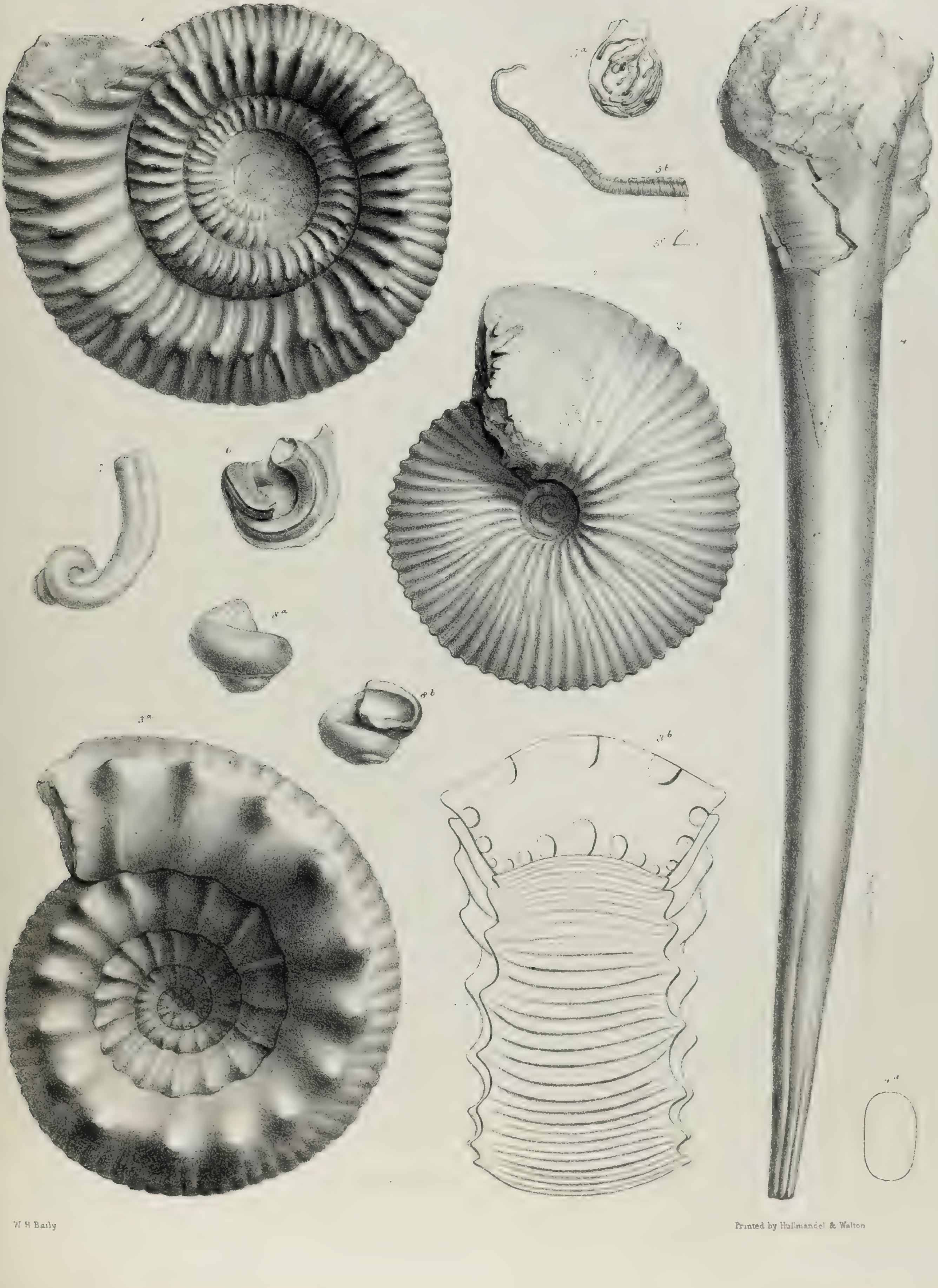

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PLATE XV.

YORKSHIRE SHELLS.

Fig.	
1.	Trochus monilitectus, *p.* 116.
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17.	Natica adducta, *p.* 112, front view.
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18.	Natica punctura, *p.* 112.
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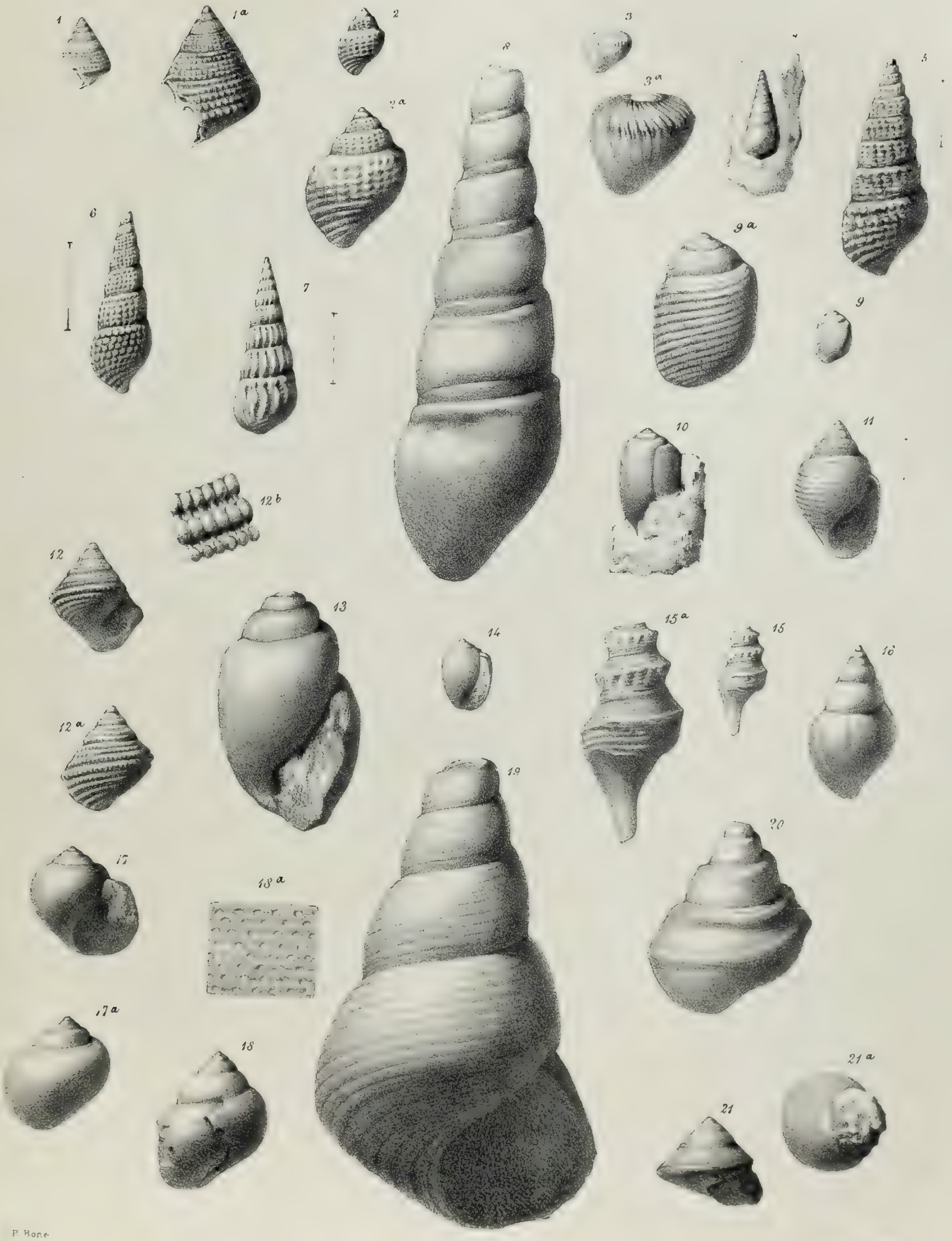
20.	Natica (Euspira)? cincta, *p.* 113.
21, 21*a.*	Trochus? Leckenbyi, *p.* 115. (In Mr. Leckenby's collection.)

* In this figure the costæ near the suture are too much indented.



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LONDON:

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A MONOGRAPH

OF

BRITISH

OOLITIC AND LIASIC BRACHIOPODA.

BY

THOMAS DAVIDSON,

MEMBER OF THE GEOLOGICAL SOCIETY OF FRANCE.

PART III.

LONDON:
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A MONOGRAPH

OF

BRITISH OOLITIC AND LIASIC BRACHIOPODA.

PRELIMINARY REMARKS.

UNDER the lowest member of the cretaceous system, we discover an extensive series of strata, consisting of different kinds of sands, sandstones, limestones, and clays, divided into a number of groups, known to geologists under the name of Jurassic, or Oolite and Lias Rocks. These form together a system of great thickness, traversing our island from the Yorkshire Coast to that of Dorsetshire in the shape of a band, varying in breadth from a few miles to between fifty and sixty in its midland course.

Great Britain is considered the typical country whence continental geologists obtained the first clue to those divisions which, with differences only in the nature of their composition, have been traced over many parts of our globe.

The object of the present Monograph is not to enter into the Geology of this system, which has been so ably illustrated by many celebrated British and Continental Geologists, but an endeavour to trace the forms or species of *Brachiopoda* which lived at different periods, while this vast amount of sediment was being deposited in the depths of the sea.

It may, however, be useful for the sake of reference, to give a tabular view of the different members of the Oolite and Lias series. We cannot do better than extract it from Mr. Tennant's 'Stratigraphical List of British Fossils:'

Potland Stone and Sand	Coarse oolitic shelly limestone; sometimes fine-grained or compact, thick-bedded, and with layers of chert, and with subordinate beds of sand.	Isle of Portland; Brill, &c., Aylesbury, Bucks; Thame, Oxon; Tisbury, Wilts.
Kimmeridge Clay . .	Dark blue and grayish laminated clay, with gypsum and bituminous shale.	Kimmeridge, Dorsetshire; near Oxford; Stone and Hartwell, Bucks; near Swindon.

Upper Calcareous Grit, Coral Rag, Lower Calcareous Grit	Coarse shelly limestones, more or less thick-bedded; coarse oolitic limestones abounding in corals, calcareo-siliceous grit.	Headington, Oxon; Westbrook, Calne, and Steeple Ashton, Wilts; Malton and Scarboro', Yorkshire.
Oxford Clay, Kelloway Rock	Dark blue clay, with *Septaria;* sometimes slaty and bituminous, with a subordinate band of ferruginous sandy limestone (Kel. rock).	Chippenham and Wooton Basset, Wilts; Oxford; Yorkshire, &c.
Cornbrash	Coarse rubbly limestone, thinly laminated with layers of clay.	Stanton, Malmsbury, Ashford, Wilts.
Forest Marble	Thinly-laminated shelly limestone, sand, and gritstone, with layers of clay.	Corsham, Box, &c., Wilts; Sapperton, Bradford, Cirencester.
Bradford Clay	Layers of clay; sometimes alternating with bands of limestone.	Bradford, Burfield, Pickwick, Tetbury.
Great Oolite	Oolitic shelly limestone, more or less compact and sandy, sometimes thick bedded.	Bath, Bradford, Minchinhampton Common (very fossiliferous).
On the Yorkshire Coast, the Great or Bath Oolite (*b*), (a hard, blue limestone; fine-grained Oolite; hard blueish clay,) is contained between two thick beds (*a*, *c*) of gritty laminated sandstones and shales, containing an abundance of terrestrial plants.		(*a*) Cayton and Gristhorpe Bays; (*b*) Cloughton and White Nab; (*c*) between Cloughton Wyke and Blue Wick.
Stonesfield Slate	Oolite, shelly, and gritty limestone; slaty.	Stonesfield, Oxon; Sevenhampton Common, &c.
Fullers-earth Clay	. . . .	Bath, Box, near Stroud, and Hampton Common.
Inferior Oolite	Two layers of coarse shelly ragstone, with intervening bands of marl and soft freestone. Fine-grained sandstone and ironstone.	Dundry, Painswick, Brinscombe, The Cotteswolds, Blue Wick, Yorkshire.
Lias	Alum shale; rubbly and sandy shales, &c. Lower Lias limestone and shales.	Whitby, Redcar, Yorkshire; Gloucestershire; Somersetshire; Lyme Regis, &c.

These names and divisions are in general use, though each continental country has, in some cases, adopted synonymous denominations, which they always endeavour to attach to the British original type.[1]

The latest innovation is published by M. D'Orbigny, in a small elementary work, where he proposes the following classification:[2]

[1] For ample information, consult the works of W. Smith, Conybeare and Phillips, Sir C. Lyell, Sir H. De la Beche, Sir R. I. Murchison, Professor Phillips, Morris, Webster, Buckland, Lonsdale, Buckman, Young, and Bird, &c.; and the works of Elie de Beaumont, Dufresnoy, Baron Von Buch, Alcide D'Orbigny, Bronn, Pusch, Rœmer, D'Archiac, &c.

[2] 'Cours élémentaire de Paléontologie et de Géologie Stratigraphique,' par M. D'Orbigny. 1850.

Terrain Jurassique . étages Portlandien.
„ Kimméridgien.
„ Corrallien.
„ Oxfordien.
„ Callovien.
„ Bathonien.
„ Toarcien.
„ Liasien.
„ Senemurien.

We are not struck with the superiority of this newly-proposed arrangement over the one in common use, which we have adopted in the following pages, as it is never advisable to burden science with fresh names when old ones serve the same purpose. To the late Mr. Sowerby and other authors we are indebted for numerous correct descriptions of many species from the Oolitic and Liasic series; but the recent impulse given to the study of Palæontology has brought to light so vast an assemblage of new forms and better representatives of several known ones, that it has been deemed advisable to reconsider and publish, under the form of a series of Monographs, all the old species revised, annexing the new forms due to the exertions of local geologists, who have done so much to advance our knowledge of this and other classes, without whose assistance we never could hope to achieve the laudable ends proposed by the Palæontographical Society and their liberal and learned Secretary.[1] Within the last few years, attempts have been made with more or less success to throw light on the class of shells occupying us at present, through an endeavour to classify them by their general affinities. Our object is simply to treat of the Oolitic and Liasic species, comprising only a few genera, because we confine within more general limits as many characters, said to be generic, which we consider to be only specific or sectional differences, and which future discoveries will tend to generalise. How frequently have gaps existing in the zoological chain of affinities[2] been filled up of late years by the discovery of forms unknown to early writers, proving how boundless the field of research is in the kingdom of Nature, and how cautious we should be in assuming the uniform prevalence of characters by which we isolate Families or Groups from the remainder of their class.

---

[1] It is therefore pleasing to me to express my grateful feelings and sincere thanks for the kind and liberal assistance I have received in the preparation of this work from MM. Bouchard, Deshayes, Deslongchamps, Buvignier, Milne Edwards, Valenciennes, De Verneuil, Delessert, De Koninck, Morriere, Chenu, &c.; from Messrs. Koïnig, Waterhouse, Woodward, of the British Museum; Sir H. De la Beche; Professor Forbes and Mr. Salter, of the Geological Survey; the Geological Society's Museum; that of Bristol, &c., where I was allowed to make use of the valuable collections deposited there; from Messrs. Bowerbank, Walton, Moore, Morris, J. de C. Sowerby, Hugh Miller, Robertson of Elgin, M'Coy, Rose of Swaffam, Riply of Whitby, Marder, Bean and Leckenby of Scarboro', Tennant, Faulkner of Deddington, Buckman, King, Dr. Wright of Cheltenham, Mr. Cunnington of Devizes, Messrs. Lycett, Lowe, Griesbach, and others, who have communicated to me the Palæontological treasures belonging to their respective collections.

[2] For various reasons we have commenced with the species of the Oolite and Lias; but it is of little importance, as this work is to be composed of a number of distinct monographs. Next year we hope to be able to give the general introduction, in which we shall state our views on the classification and genera.

However much we may feel inclined to dispute the existence in Nature of genera and species, as an abstract proposition in the Philosophy of Zoology, the admission of these terms, and of the ideas we are accustomed to associate with them, are essential to the progress of science. This being the case, we ought at least to found genera in a uniform manner, and to equalize as much as possible the value of the characters upon which they are based. If, among the conchiferous molluscs, some trivial modifications in the position of the processes which protect their valves from dislocation be admitted, as of generic importance, we surely ought not in the Brachiopoda to place together shells of such different structure, as we remark in *T. Carnea* and *T. Concentrica*. M. Deshayes formerly admitted very few genera in the Brachiopoda; but from communications made by him to me, I believe he now considers that a larger number are required from our present more extended knowledge of the differences presented by the internal characters of the shell. The value of these aids in the discrimination of genera is strongly insisted upon by M. Deshayes in his great work upon the Paris Basin, where he states M. Blainville was one of the first to remark, that in the recent Terebratulæ the *Apophysary lamella* which support the soft parts, present peculiar forms in each species, and adds, "Ce serait donc par ce moyen que l'on pourrait déterminer rigoureusement les nombreuses espèces du genre."

For many years our researches have been bent upon the discovery of those internal characters; as we feel convinced that by them alone a rational and permanent classification will in time be arrived at. Through our exertions, and the help of many kind and zealous friends, we have been able to examine the internal structure of most of our British species which disposes us to admit the following genera among them:—

1. Lingula.
2. Orbicula.
3. Crania.
4. Thecidea.
5. Leptæna.
6. Spirifer.
7. Terebratula.
8. Terebratella.
9. Rhynchonella.

Many more have of late been proposed among our Oolitic species, but which we hope to discuss in the general introduction, and shall merely here observe, that the greater or less length of a simply attached loop in Terebratula cannot be made use of as a generic character, especially when there exists no other distinctive points. The length of the loop may be used as sectional, round which we can group certain species; but who, with any degree of confidence, would place in distinct genera such shells as *Ter. Cornuta, quadrafida, numismalis, obovata, digona, ornithocephala,* &c., which have a simply-attached loop extending to near the frontal margin of the valve, and those such as *Ter. punctata, perovalis, Maxillata, intermedia sphæroidalis, Coarctata*, &c., the loop of which, simply attached to the crura, only extends to less than half the length of the valve, while in others, such as *Ter. Carnea, Dyphia*, &c.; the same process attached to the crura does not extend to more than a fifth of the length of the shell. We have in vain attempted to find out some external character by which we might discover if the species had a long or short loop; it had been imagined that those with a long loop were flatter, depressed in the smaller valve, and with lateral ridges of the beak strongly defined; but this character falls to the ground when we place in comparison such shells as *Ter. perovalis* and *punctata,* that have a short loop, with *Ter. ornithocephala, digona,* and others with a long one, all possessing a similar convexity of valves and other external characters. I have lately observed that the crura differs slightly in those specimens with a short or long process, as may be seen from the figures illustrating the interiors of *Ter. Cornuta, resupinata, ornithocephala,* &c., on one side, and those of *Ter. Maxillata, intermedia, sphæroidalis,* &c., on the other; and it will be perceived that in the elongated looped shells the crural base is much larger, and forms a flat surface, which does not exist in a similar manner in the others.

The punctures visible in Terebratulæ and other genera cannot be used as a general character to distinguish species, as the results of microscopical examination show us that their size and form varies on the same shell, according to the portion placed under examination; thus on one part we find the punctures widely separated becoming closer and larger towards the edge until they assume a completely different appearance; and although some species have a *marked* difference in this respect, others present no distinctions. Professor King, in his valuable 'Monograph on Permian Fossils,' goes too far, in our opinion, while stating that he believes few Brachiopoda unpunctuated, as very many shells in this class show no traces of punctures; but at the same time we believe that many species considered unpunctuated are really so. It had been supposed, till very lately, that the *Liasic* species of spirifers were characterised and distinguished by being punctuated, while other spirifers were not so; this opinion, must however, be abandoned, from the fact observed by Professor King, that many carboniferous spirifers, very different in shape and character, were likewise so, which has been also confirmed by M. De Koninck and others. Before entering into the subject of this Monograph, we think it necessary to state, that the confusion and contradictions we have found in authors were so great that it has in many cases been no easy matter to find out the original types. Many of Sowerby's and Lamarck's species, as well as those of other authors, have been singularly misrepresented, and in fact have been but little understood by the generality of Palæontologists and Geologists, who usually do not attach much importance to these determinations.

While reviewing the Lamarckian species of Terebratulæ, I was surprised to find in that celebrated collection many shells quite differing in species from those intended by the author of the 'Min. Con.;' and these errors seem so current abroad, that even the most distinguished Palæontologists, such as Von Buch, Bronn, D'Orbigny, and others, have placed in their catalogues, as Sowerby's species, shells, differing completely, as will be alluded to during the course of this work. Many of these mistakes are excusable, and might have been expected, from the unfortunate foreshortened position in which that author represented some of his shells. Through the kindness of Mr. J. de C. Sowerby, who in the most liberal manner placed the original collection of the M. C. at my disposal; and with the assistance of Mr. Waterhouse, we have endeavoured to clear up the original types, some of which were merely synonyms, such as *Ter. Triquetra, orbicularis, furcata, lata*, &c. &c.

The difficulty I have encountered, in my endeavours to place the different shells hitherto discovered in their proper places, is such, that I feel convinced numerous errors will have been committed, which I hope other observers and future discoveries may correct. No class of shells is more variable in their form, and the instances in which the former pass into each other are so numerous, that by some one or other character we might readily attach most species together. We often forget, that among the species of Brachiopoda there must have existed different races, as well as in those of other classes, arising from local conditions, and by the little attention paid to these circumstances species are made out of more varieties. It is certain that many species were ornamented by colour, such as we perceive among the recent shells; this colour, which would have been a great help, we are deprived of; its existence, however, is proved by accidental specimens found occasionally possessing traces of it,—we know that some Devonian species were spotted with red. *Ter. Hastata, Communis,* and others irregularly and longitudinally striped, probably also with red, as we see in *Bouchardia rosea;* and among the oolite species it is more than probable, from traces discovered by M. Deslongchamps, that *Rhynchonella spinosa* was of a red colour, as well as some of the cretaceous species. From the limited resources often left us by fossilization we are not always able to trace correct boundaries to species; but we should endeavour to do so where characters are sufficiently marked to be constant, and which may serve as conventional points of comparison and reference.

After many years of researches, M. Deslongchamps[1] published his views on the classification of the Brachiopoda found in Normandy—a paper I have long appreciated, but which, to my surprise, is little noticed by those who have written on a similar subject. In it that distinguished and conscientious author states, that after many different attempts to classify the Brachiopoda, he found the best outward characters to consist in the shape and position of the foramen; since which period Messrs. Morris, D'Orbigny, and others, have thrown much additional light on this point by the discovery that the form of the internal Apophysary system also bore intimate relations to the form and position of the beak, foramen, and deltidium. This, moreover, appears to be the best mode of proceeding where the internal characters are hidden from our view; but, while this character is of generic importance, it does not always help us to separate species. M. Deslongchamps, in his table, proposes to select a type and annex to it a number of allied forms, under the name of varieties: thus of *Ter. resupinata* he mentions twelve varieties, of *emarginata* fifteen, of *perovalis* eleven, of *Concinna* twenty, &c.; and he could have added many more had he operated upon a larger collection; and although I completely agree with M. Deslongchamps as to the reality of his varieties, still this system would, it is to be feared, lead to great confusion,

[1] 'Séances publiques de la Soc. Lin. de Normandie,' 1837, p. 30.

from the interminable list of perplexing varieties, impossible to be remembered. Several of these M. Deslongchamps admits, such as *Ter. Triguetra* and *Ornithocephala,* themselves only varieties of age and shape of the same species. We therefore think it preferable, for the sake of convenience, to admit artificially more species and less variety; and, in order to incorporate certain smaller variations, the description of a species should be so framed as to embrace the general idea of the thus limited form rather than the account of a single specimen.

Local causes and malformation, caused by pressure or fracture during the different stages of growth, are not to be wondered at in a class of shells destined in general to sedentary life, living and dying on the same spot attached to rocks, or in circumstances where there existed a want of room for their complete development. These malformations, alluded to by M. Deslongchamps, are much more common than generally imagined, and have often been made into distinct species by different authors, from the inspection of a single specimen. It is likewise certain, notwithstanding what may have been said to the contrary by some more learned Palæontologists, that the limits in vertical range of some species have extended to more than one group of strata, although species commonly are characteristic, and restricted to narrow bounds. We must also allude to some technical denominations made use of to denote the different parts of a shell; thus, for a considerable period, and in many important works, the term *dorsal* has been applied to the larger or perforated valve, and that of *ventral* to the smaller one. I do not wish here to contest the observations which induced the celebrated anatomist, Professor Owen, to reverse the denomination of the valves from the relative disposition of the animal to the valves, which in some genera, such as Orbicula, would be the reverse of that in Terebratula. Because of the immense confusion such a change would unavoidably create in works already published, we have determined to banish completely the terms *dorsal* and *ventral* from our descriptions, and to adopt other terms, also in use, to distinguish the same parts: thus we will use indiscriminately the words *perforated, rostral,* or *large valve,* for the one considered by De Buch and others a *dorsal,* the *ventral* of Professor Owen, and that of *imperforated, upper* or *smaller,* for the lesser valve.

So variable are Brachiopodes in shape, size, gibbosity, &c., that we cannot employ angular measurements proposed by Von Buch, as those characters vary in every specimen; nor do we attach much importance to the dimensions we give to each species. In general we have taken those of the best developed specimen which has come under our notice. Nor are the number of plaits more constant. We find the same species, especially among the *Rhynchonellas,* have one, two, three, four, or more plaits on the mesial fold; thus most species, smooth in the young, are plaited or otherwise ornamented at a more advanced period of growth; it is therefore, in most cases, impossible to determine species from young shells.

In concluding these few preliminary remarks, it is necessary to state, that merely the synonyms and references likely to prove useful are inserted, as it would have been impossible to mention all the authors who have alluded to certain known species without figuring or describing them. Many errors have been committed, and much *confusion* produced, by the rapid manner in which some authors have determined their species; we will not, therefore, refer to those which are published simply under the form of lists.[1]

Genus—LINGULA, *Bruguière*. 1789.

Shell inequivalved, one valve more convex than the other, more or less oval, elongated, tapering and pointed at the beaks, widened at its palleal region, without hinge, valves held together by the adductor muscles; attached to submarine bodies by a long muscular peduncle issuing from between the beaks, a groove existing for its passage in that of larger valves; arms fleshy, without any shelly support; structure horny, covered by an epidermis; two muscular impressions on the one, four on the other valve.[2]

Obs. We are only acquainted with one authentic species of British Oolitic Lingula, *L. Beanii.* Sowerby mentions another, *L. ovalis,* as from Kimmeridge clay, but which appears to belong to the lower green sand. It is worthy of remark, that the genus Lingula, one of the oldest created forms, has persisted, with very little variation in shape, up to the present day, a circumstance very unusual among the Brachiopoda.

1. LINGULA BEANII, *Phillips.* Plate I, figs. 1, 1*a*, 1*b*, 1*c*, 1*d*.

LINGULA BEANII, *Phillips.* 1829. Geol. of Yorksh., Part i, pl. 2, fig. 26.
— — *Morris.* 1843. Catalogue, p. 122.
— — *Dav.* 1847. Lond. Geol. Journal, vol. i, pl. 18, figs. 26—30.
— — *Bronn.* 1849. Index Palæontologicus, p. 655.
— — *D'Orb.* 1849. Prodrome, vol. i, p. 286.

Diagnosis. Shell irregularly oblong, oval, rounded in front; valves thin, convex, with numerous concentric lines of growth; internal muscular impressions strongly marked. Dimensions variable; average size 10 lines long by 6 broad.

Obs. Professor Phillips was the first to notice this species in his work on the 'Geology of Yorkshire,' but gives no further description than that it approaches *Ling. mytiloides* of Sowerby. From the great resemblance various species of *Lingula* bear to each other, it is often difficult to distinguish and describe them. Professor Phillips states this species to occur in the inferior Oolite of Yorkshire; it has also been found in the marlstone near Bathford, during the cuttings for the Great Western Railway, by Mr. Walton, whence the fine internal specimens figured in Plate I, figs. 1, *a, b, c, d,* were obtained; these figures are enlarged.

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[1] From the necessity of bringing out the work in parts, and from the strong aversion we have to the objectionable practice of giving lists of new species before they are described and figured, we cannot here give the tables and general conclusions as to the distribution of the various species till the conclusion of the series of Monographs on these subjects.

[2] For more ample details, see general Introduction.

I do not know any other English Oolitic species; fragments of a Lingula have been found by Mr. Moore in the upper lias of Ilminster, but not sufficiently perfect to be described or identified.

Figs. 1*a*, 1*b*, represent the larger valve enlarged, with the groove for the passage of the muscular peduncle.

Figs. 2*c*, 2*d*, smaller valve enlarged. It will be seen by these figures the muscular impressions vary slightly in different specimens.

Genus—ORBICULA, *Cuvier.* 1798.

Shell inequivalved, more or less orbicular, upper valve conical, with apex nearer the posterior margin, smaller valve depressed, flat, or slightly convex, affixed to submarine bodies by a tendinous pedicle issuing through a fissure, varying in length and size, extending from its centre to near the margin; no hinge, or calcareous shelly supports; structure horny.

Obs. We are only acquainted with three British Oolitic Orbiculæ, viz., *O. Townshendi, reflexa,* and *Humphresiana; O. Townshendi* is the largest orbicula known. Two other shells have been placed among the orbicula: *O. granulata,* Sow., M. C., Tab. 506, fig. 34, stated to be from the great Oolite of Ancliff, and *O. radiata,* Phillips, Geol. of York, Tab. 4, fig. 12, as from cor. Oolite of Malton; these, however, do not seem to belong to the class of Brachiopoda, but to that of Gasteropodes.

2. ORBICULA TOWNSHENDI, *Forbes,* MS. Plate I, figs. 2, 2*a*, 2*b*.

Diagnosis. Shell bivalve, thin, almost circular, upper valve very convex, regularly rounded; apex near the posterior margin, greatest elevation of the valve towards the central part, the apex lying considerably lower; surface smooth, horny, with irregular circular lines of growth; inferior or attached valve, slightly concave, with deep depression, extending and widening from the centre to within a short distance from the posterior margin, leading to a long, wide, ovular fissure, from which the peduncular fibres issued, and which must, in this species, from the depth of the valve, have been of some length, the fissure measuring 5 lines in length and 3 in breadth, and extending to within 4 lines of the margin of the shell. This valve is ornamented by numerous and regular slightly-elevated concentric striæ, not all forming the complete circle, sometimes extending only to a certain distance, while at other times they dichotomize or unite into strong, wide striæ, especially towards and between the fissure and anterior margin. Interior unknown; length and breadth 19, depth 7 lines.

Obs. This is the largest and finest species of orbicula with which I am acquainted, and only approached by a specimen shown me by M. D'Orbigny, from the lias of France, believed to be distinct by that author, both species forming part of a sub-genus among the orbiculæ proposed by him, under the name of *Orbiculoidea.*

I am indebted to the liberality of the Geological Survey for the loan of this magnificent specimen, forming part of their collection, and named by Professor Forbes after the late Mr. Townshend, who found and bequeathed it to that establishment. Unfortunately the ticket has been lost, but I am assured that it is from the Oxford clay beds of the southern districts of England.

3. ORBICULA REFLEXA, *Sow.* Plate X, fig. 8.

ORBICULA REFLEXA, *Sow.* 1829. M. C., vol. vi, p. 4, pl. 506, fig. 1.
— — Zool. Journal, vol. ii, p. 321.
— — *Morris.* Catalogue, 1843.
— — *Bronn.* 1849. Index Palæont., p. 848.
ORBICULOIDEA REFLEXA, *D'Orb.* 1849. Prodrome, vol. i, p. 258.

Diagnosis. Shell bivalve, subelliptical, thin, upper or unattached valve convex, with apex directed towards and near the posterior margin; surface shining and smooth, with the exception of numerous fine concentric lines; structure horny; lower or attached valve nearly flat; aperture for the muscular byssus large and elongated. Length 7, breadth 6, depth 3 lines.

Obs. Two fine specimens of this orbicula are to be seen in the collection of the British Museum, attached to an arca, and said to be from the lias of Northampton. We find Peak Whitby mentioned by Mr. Morris, but never having found the shell in situ can add no other details. It has sometimes been mistaken for a similar but more circular orbicula, found in the coal measures of Coalbrook dale, and it seems even probable that Sowerby's figures were drawn from some specimens of that species.

4. ORBICULA HUMPHRESIANA, *Sow.* Plate I, figs. 3, 3*a*, 3*b*.

ORBICULA HUMPHRESIANA, *Sow.* 1829. Vol. vi, p. 5, pl. 506, fig. 2.
— — *Morris.* 1843. Catalogue.
— — *Bronn.* 1849. Index Palæont., p. 847.

Diagnosis. Shell bivalve, more or less circular, conical, apex elevated at some distance from the posterior margin; surface of upper valve ornamented by numerous longitudinal diverging striæ, from the apex towards the marginal line; lower valve unknown, attached to ostrea deltoidea. Length 6, breadth 5 lines.

Obs. The only specimens I have seen and figured in my Plate I. are from the collection of Mr. Sowerby, and would appear to have been found in the Kim clay, Shotover, Oxon. Fig. 3*a* is an enlarged illustration. Among the recent species we find more than one longitudinally striated. *O. Cummigii*, &c.

Genus—Crania, *Retzius.* 1781.

Shell unequivalve, circular or subquadrate, more or less irregular, entirely or partially attached by the substance of smaller valve to rocks, corals, and other submarine bodies; upper valve conical, with lateral or subcentral vertex, without hinge or ligament; lower or attached valve thickest, often irregular, due to the nature of the object to which it is fixed; surface strongly punctured or spongy; four circular depressed, or produced muscular impressions in each valve, the first two, formed by the adductor muscles, are situated near the cardinal edge, the other pair are approximated and placed near the centre, behind which a central prominence is sometimes seen; the space between these and the wide, thicker, granular margin surrounding the shell, is divided by the digitated genito-vascular impressions; arms fleshy, free only at their extremities; no calcareous supports.

Obs. We are only acquainted with two British Oolitic cranias, *C. Antiquior* and *C. Moorei*, and, unfortunately, of these only one of the valves has been hitherto discovered.

5. Crania Antiquior, *Jelly.* Plate I, figs. 4—8.

Crania antiquior, *Morris.* Catalogue, 1843.
— — *Dav.* London Geol. Journal, vol. i, pl. 18, figs. 21—25. 1847.
— — *Bronn.* Index Palæont., p. 342. 1849.
— — *D'Orb.* Prodrome, vol. i, p. 316. 1849.

Diagnosis. Shell suborbicular, irregular, the lower valve only known; it varies in form, some specimens being almost flat, others more or less concave, and even occasionally patelliform. The muscular impressions are four, more or less; strongly marked in different examples; the two posterior are generally larger and more widely separated than the two anterior ones, which latter usually touch, and are also less circular in form than the upper, and depressed in the centre. In most examples a strongly-marked ridge is seen extending in the mesial line, from the junction of the lower muscular impressions to the margin of the shell, as displayed in fig. 8. The very peculiar spongeous structure, characteristic of the genus Crania, is well marked. In form and general appearance this species somewhat approaches *Crania abnormis* of the tertiary period. Length 7, breadth 6½ lines; some specimens are almost square. From the appearance of the exterior this Crania would not seem to have been much attached.

Obs. A very extensive series of specimens of this species, forwarded to me by

Mr. Walton and Mr. Pearce, of Bath, as well as numerous specimens collected by myself, have enabled me to note the extreme variations exhibited in its general form and shape of the muscular impressions. Sometimes these impressions project in the prominent manner shown by figs. 4, 6, 8, while at other times they are barely distinguishable; in one specimen, belonging to Mr. Pearce, the whole four, where actually depressed, producing a remarkable concavity in the valve. Mr. Pearce was at first disposed to consider these specimens as examples of the upper valve, an opinion, however, he afterwards relinquished; and, curiously enough, although many hundreds have been collected by Messrs. Walton and Pearce, they have not been able to obtain the upper valve in any one instance.

This species was originally discovered by the Rev. H. Jelly, who applied to it the specific appellation "Antiquior," but no figure or description appeared before May, 1847, when I described and figured it in the London Geological Journal, the only published record respecting it being the insertion of this name in Mr. Morris's valuable Catalogue of British Fossils, in 1843.

The Crania Antiquior is found in the great Oolite of Hampton Cliff, near Bath; the specimens figured are from the collection of Mr. Walton.

All the figures are of natural size, except fig. 8, which is enlarged.

6. CRANIA MOOREI, *Dav.* Plate I, fig. 9.

Diagnosis. Shell irregular, transversely oval, suborbicular, truncated posteriorly; upper valve convex and slightly conical, with the vertex near the centre; surface smooth and punctuated; interior presenting four muscular impressions, the posterior ones slightly marked, as well as the anterior two, which are arranged in the form of a V. The digitated genito-vascular impressions hardly visible; interior closely punctuated. Length and breadth about 1 line. The upper valve only is known.

Obs. This small species was found by Mr. Moore, in the upper lias, near Ilminster; its position is higher than that of those beds containing the Leptœnas in the same locality. The figure is drawn from a specimen kindly given to me by Mr. Moore, and I take great pleasure in naming the species after him.

Plate I, fig. 9, natural size. Fig. 9, *a, b,* enlarged.

Genus—THECIDEA, *Defrance.* 1828.

Shell unequivalved, thickened, more or less irregular; largest valve partially or entirely attached by its own substance, or, when young, in some species by a peduncle issuing from the extremity of the beak to submarine bodies; form longitudinally or transversely oval, sometimes subquadrate; upper valve small, more or less convex, smooth, or otherwise ornamented, granulated, structure punctuated; hinge line more or less straight, with two strong teeth in the attached valve, adapting themselves into corresponding sockets in the smaller valve; beak more or less produced, with long or wide well-defined area and deltideum. Interior of valves variable; in larger valves a longitudinal, central, and two lateral ridges are generally more or less visible, under which two deep muscular impressions are seen; upper valve complicated, more or less deeply and regularly sinuated by an apophysary testaceous ridge, united all round, and leaving a small cavity in the upper portion of the valve free for the body of the animal, these sinuated ridges varying in number, position, and extent in different species; two strong lateral adductor muscles situated under the hinge, no arms, animal small.

Obs. We are acquainted with five British Oolitic species of Thecidea, four from the Lias, a fact hitherto unrecorded, and two in the Inferior Oolite.

7. THECIDEA MOOREI, *Dav.* Plate I, fig. 10.

Diagnosis. Shell irregular, inequivalved, attached by the greatest portion of its inferior valve, almost square; attached or lower valve, modelling itself to the object on which it is fixed, with elevated sides and front rising perpendicularly from the attached part; area well defined, triangular, and receding from its junction with the upper valve; deltidium large, elevated with slight central depression, and marked, as well as the area, with numerous lines of growth. Upper valve almost flat, of a transversely oblong square, with slight depression in the centre, and the sides, except at the hinge, turning sharply over, and forming elevated sides, till they meet the edge of the lower valve, so that the front is very much elevated. Surface strongly punctuated; interior of attached valve only known; hinge line straight, with two strong teeth and elevated mesial ridge. Length and breadth about 2 lines; frontal elevation 1 line.

Obs. Twelve specimens of this remarkable little Thecidea were found attached to a specimen of Rhynchonella serrata, from the marlstone or middle lias in the neighbourhood of Ilminster, along with Thecidea *Bouchardii* and *triangularis*, by Mr. Moore, to whom I feel much pleasure in dedicating the species. These and another, *T. rustica*, are the first specimens of this genus hitherto noticed, as far down as the Liasic period; no mention is made of this genus in M. D'Orbigny's Prodrome; they would appear to be the oldest Thecideas at present known. Mr. Moore also has one specimen of this species, found in the upper lias, from the neighbourhood of Ilminster. *Th. Moorei* is easily distinguished from all other known Thecideas, by its square shape and elevated front.

Plate I, fig. 10, illustrates specimens of natural size, from the collection of Mr. Moore; fig. 10, *a—e*, are enlarged.

8. Thecidea Bouchardii, *Dav.* Plate I, figs. 15, 16.

Diagnosis. Shell irregular, inequivalved, of an elongated transversal form, attached by the greatest part of its lower valve; area in larger valve long and straight, receding from its junction with the upper valves, and at almost right angles to it; deltidium well defined, elevated, and marked by lines of growth, which extend also over the area; upper valve slightly convex, smooth, and strongly punctuated; greatest height at hinge line receding thence to the frontal margin. Interior of attached valve only known; hinge line straight, with two strong teeth and internal elevated mesial ridge, and wide, strongly-granulated margin, leaving two deep depressions on each side of the central elevated ridge. Length 1¼, breadth 2 lines.

Obs. Three specimens of this species were found attached to the same specimen of *Rh. serrata*, or along with *Th. Moorei*, and consequently from the middle lias, and I feel much pleasure in dedicating it to M. Bouchard; its locality is the neighbourhood of Ilminster. M. Tesson, of Caen, showed me a specimen of Thecidea, which approaches this very much in form, and is found in the liasic beds of Fontaine Etoupe Tour, near Caen, in Normandy, and I should not have hesitated in saying it was the same species, had the dimensions of the French specimen not exceeded three times those of our English shell. *Th. Bouchardii* is easily distinguished from the other forms of this genus by its great breadth, and appears a much more delicate species than either T. Moorei or T. triangularis.

Plate I, fig. 15, natural size of a specimen in Mr. Moore's collection; figs. 15*a*, 16, and 17, enlarged views.

9. Thecidea Dickinsonii, *Moore*, MS. Plate XIII, fig. 19.

Diagnosis. Shell of an elongated transversal form, unequivalved, and attached by the greatest part of its lower valve; area and cardinal edge straight, and not quite as long as the greatest width of the shell; upper valve slightly convex, smooth, and punctuated. Length 1½, width 2½ lines.

Obs. This is the largest Inferior Oolite *Thecidea*, I believe, as yet known, and is attached to a specimen of *Ter. perovalis*, from Dinnington, belonging to Mr. Moore, who named it after his friend Mr. Dickinson. We find also, in the same locality, *Thecidea triangularis*, which is easily distinguished by its shape.

10. Thecidea Triangularis, *D'Orb.* Plate I, figs. 11, 12.

Thecidea triangularis, *D'Orb.* (?) 1849. Prodrome, vol. i, p. 316.

Diagnosis. Shell irregular, inequivalved, attached by the greatest portion of its lower valve, more or less triangular, gibbose, produced behind, and somewhat bilobate in front;

area of attached valve triangular, more or less lengthened, with distinct deltidium; small valve operculiform, convex, with slight depression in centre, punctuated; the interior of attached valve only known. Length 1 line, breadth the same.

Obs. I believe this to be the same species as M. D'Orbigny mentions, but which he neither describes nor figures in his Prodrome, under the name of *Th. triangularis*, as occurring in the Oolitic beds of Ranville, in Normandy, and which name I will here adopt, as, on comparing it with our English specimens, I could find no difference.

In England this species appears to have first appeared in the middle lias, as Mr. Moore found it attached to *Rh. serrata*, and it was afterwards found by Dr. Wright, Mr. Morris, and myself, in the Inferior Oolite of the Cotswold and Leckhampton hills, attached to *Ter. plicata*, *Rh. Wrightii*, to *corals*, and to probably any other shell in that bed. In Normandy it is found a little higher up.

This species also strongly resembles (except in size) the recent *Thecidea Mediterraneum*, as may be easily perceived on looking at the figure of that species, (Plate I, fig. 13,) which I have purposely placed by the side of *Thecidea triangularis*. Our fossil species does not appear, however, to have ever attained the dimensions of the recent species.

Plate I, fig. 11, natural size of Mr. Moore's specimen from the marlstone; fig. 11, *a*, *b*, enlarged view of the same. Plate I, fig. 12, natural size of one of the Inferior Oolite specimens; 12*a*, enlarged. Plate I, fig. 13, recent *Thecidea Mediterraneum*.

11. Thecidea Rustica, *Moore*, MS. Plate I, fig. 4.

Diagnosis. Of this small Thecidea we are acquainted with only the upper or unattached valve, and therefore the description must consequently be very incomplete. Unattached valve slightly convex, of a squarish circular form, as long as wide, smooth and punctuated, interior presenting two sockets, in which the teeth of the unattached valve articulate from under an elevated crest or lamella, surrounding the shell at some distance from the edge, and, on reaching the frontal margin, it takes a curve towards the middle of the valve; returning again to the margin, it terminates under the other socket, the position between this ridge and the edge of the shell being strongly granulated, and presenting another smaller ridge, which also joins the sockets, after having gone round the shell. The sinuses observable in *Thecideas*, and which form so many elevations in its centre, are hardly perceptible in this species; there is a slight elevation, strongly granulated, on each side of the first described ridge. Length 1 line, breadth the same.

Obs. The internal organisation of this species is more simple than that generally seen in Thecidea, but it must also be observed that the number of the lamellæ, or ridges, forming the sinuses in this genus, and which represent the calcareous supports in Terebratula, vary very much, as may easily be perceived, in casting a glance over *Thecidea hippocrepis*, *tetra-*

gona, papillata, hieroglyphica, recurvirostris, digitata, antiqua, &c. This last-named species approaching more than any I know to our *Th. rustica,* and in all good genera we ought to find a graduated scale from the simple to the compound. Thecidea rustica was discovered by Mr. Moore in the upper lias, in the same bed containing *Lept. Moorei, Bouchardii, Liasiana, Pearcei, Sp. Ilminsteriensis,* &c., and therefore higher up than *Th. Moorei* and *Bouchardii.* Mr. Moore has given it the name of *Th. rustica,* which I readily adopt; it is much to be regretted that hitherto only the smaller valve has been found; it does not appear very rare in its bed, if one inclines to take the trouble of seeking it, which can be done only by washing the sandy clay bed where it is found, and then carefully picking them out, after having extended small portions of the washed bed on a plate. In this manner, also, are obtained the *Leptænas,* and numerous Foraminifera with which these beds abound; its locality is the neighbourhood of Ilminster.

Plate I, fig. 14, natural size, from specimens belonging to Mr. Moore; fig. 14, *a*, *b*, enlarged exterior and interior.

Genus—LEPTÆNA, *Dalman.* 1827.

Shell inequivalved, equilateral, generally transverse, sometimes oval, always compressed; smooth, striated, or exteriorly costated: *larger valve,* more or less convex or concave, sometimes bent or geniculated; beak more or less produced, straight, sometimes recurved, and perforated at its extremity by a very small circular opening; separated from the cardinal edge by a more or less elevated triangular or canaliculated area: *smaller valve,* concave or convex, following the large valve in its different curves, beak of smaller valve not much produced, with or without a linear area: deltideum complete, triangular, with angles more or less open, without reference to the development of the area; often notched at its base for the passage of the tendinous fibres of attachment; hinge transverse, straight, linear; teeth differently disposed, but always provided with two principal diverging teeth on the larger valve, which are received by sockets placed on each side of the central bifid or trifid tooth of the smaller valve: no internal calcareous supports.

Obs. We will not at present discuss the different opinions lately brought forward on this genus, or its subdivisions, each author having his way of thinking on this subject, which has involved us in great confusion; the same shell is thus for some a *Strophomena,* for others a *Leptæna, Leptagonia Chonetes, Productus,* &c. All we shall here state is, that the genus was not known to occur above the Palæozoic series before 1847, at which time M. Bouchard and myself described several species from the lower oolitic or liasic deposits; and we are now acquainted with the five following species:—*Leptæna Moorei, L. Piercei, L. granulosa, L. liasiana* and *L. Bouchardii,* all of which are found in England. *Lept. liasiana* (Bouch.) alone having as yet been discovered on the Continent.

12. Leptæna Moorei, *Dav.* Plate I, fig. 18.

Leptæna Moorei, *Dav.* 1847. Annals and Mag. of Nat. Hist., pl. xviii, fig. 1 *a*.
— — *Dav.* Bull. Soc. Géol. France, vol. vi, 2d Series, p. 270.
— — *D'Orb.* Prodome, vol. i, p. 220, 1849.

Diagnosis. Shell small, depressed, wider than long, ornamented by numerous fine costæ, scarcely visible without a lens; larger valve slightly convex; area double, as wide, or rather wider, than the shell; deltidium small, chiefly filled up by the median tooth of smaller valve, which tooth is grooved by four furrows, offering a passage for the muscular fibres of attachment passed outwards. Length 1½ lines; width 2 lines.

The muscular impressions in the interior of both valves are strongly developed in this species, and indicate that it did not attain larger dimensions than those above assigned to it.

This elegant little species was first discovered in the beds of the upper lias above the marlstone, near Ilminster, by Mr. Moore, to whom it is dedicated. The following section, forwarded by Mr. Moore, shows the position of the bed containing the *Leptænas*:—

1. Rubbly beds, 6 to 10 feet, with numerous *Ammonites*.
2. Clay, 8 inches.
3. Yellow limestone, 3 to 4 inches.
4. Layers of clay, 18 inches, *Leptæna Pearcei*.
5. Leptæna bed, 1 inch: *L. Moorei*, *L. Bouchardii*, and *L. liasiana*.
6. Marlstone, 2½ inches.
7. Greenish sand, 4 inches, containing numerous *Belemnites*.
8. Marlstone.

I do not understand the reason which has induced M. D'Orbigny to place these *Leptænas*, and other species found in the same beds, in the lower Lias (*Senemurien*, Prodrome, p. 220), where none, to my knowledge, have been discovered according with my printed description and stratigraphical position of the species, which has not been noticed out of England as yet.

Plate I, fig. 18, shows the exact size of an adult specimen of this species.
„ fig. 18 *a—e* are enlarged.

It is not a rare species in its bed, Mr. Moore having found more than one hundred specimens; but from its minuteness it is difficult and tedious to collect.

13. Leptæna Pearcei, *Dav.* Plate I, fig. 19.

Leptæna Pearcei, *Dav.* 1847. Annals and Mag. of Nat. Hist., pl. 18, fig. 4.
— — *Dav.* Bull. Soc. Géol. de France, vol. vi, 2de Série, p. 270, 1850.
— — *D'Orb.* Prodrome, 1849, vol. i, p. 220.

The larger valve only of this small species is known; from which it appears, that it differed materially from *L. Moorei*, being much more convex, and the striæ ornamenting its surface having two or three smaller intermediate ones (Plate I, fig. 19*b*); while in *L. Moorei* the costæ appear of the same size; the shape of this shell is also more rounded, and considerably larger than *L. Moorei*. Length 3½; breadth 4½ lines.

This species appears to be rare; it occurs in a clay stratum above the Leptæna bed: it was discovered by Mr. Moore.

Plate I, fig. 19, nat. size; fig. 19*a, b*, enlarged.

14. LEPTÆNA GRANULOSA, *Dav.* Plate I, fig. 20.

LEPTÆNA GRANULOSA, *Dav.* Bull. Soc. Géol. de France, vol. vi, 2de Serie, p. 270, fig. 6, 1850.

Diagnosis. Valve slightly convex, rounded and ornamented by granulous striæ, between which smaller ones are perceived (Plate I, fig. 20*b*); the area appears narrow, and has much resemblance to *L. Moorei*. Length 1½; breadth 2 lines.

It is a rare species; easily distinguished from *L. Pearcei* and *L. Moorei* by the granulations which ornament its valves: it was found by Mr. Moore in the upper Lias, in the same bed which contains *L. Pearcei*. Only the larger valve is known, and therefore it can be but imperfectly described.

Plate I, fig. 20, natural size.
,, fig. 20*a, b*, enlarged.

15. LEPTÆNA LIASIANA, *Bouchard.* Plate I, fig. 21.

LEPTÆNA LIASIANA, *Bouchard.* 1847. Annals and Mag. of Nat. Hist., t. 18, fig. 2, *a—d.*
— — *Dav.* 1850. Bull. Soc. Géol. de France, vol, vi, 2de Série, p. 270.
— — *D'Orb.* Prodrome, vol. i, p. 220.

Diagnosis. "Shell rounded, inequivalved, equilateral, smooth; larger valve gibbose posteriorly, becoming flatter anteriorly, with a slight longitudinal groove ending in a notch on the front margin of the shell. Beak small, slightly incurved, truncated at the apex by a minute circular foramen, similar to that which occurs in many other *Leptænas;* for instance, *L. alternata,* of Indiana, North America. This truncation may also be observed in some species of *Orthis,* from Russia. Area double, interrupted on the dorsal valve by a large and slightly-convex deltidium, which arises at the apical opening, and gradually enlarges towards the base, occupying one third of the width of the area. The deltidium is slightly notched, the notch being partly closed by the large median tooth of the smaller valve; the exterior face of which is grooved by four furrows, which afforded a passage for the muscular fibres of attachment, arranged in four bundles. The smaller valve is deeply concave, following the contour of the larger valve, so that little space remained between them for the body of the animal. Cardinal margin about half the width of the shell. Length 2 lines; breadth the same.

"The general form of this *Leptæna* approaches that of *Productus.* It closely resembles *L. oblonga.* (*Pander.*) It has the same convexity and smoothness, and the beak is similarly truncated by an apicial opening: the area and perpendicular opening has also some analogy to the Russian species, but differs in the contour of the larger valve, and the notch in the front margin." (*Bouchard.*)

Obs. The above description was published by M. Bouchard, in the 'Annals of Natural History,' Oct. 1847, and I have thought it desirable to reproduce it here. At that period this species had not been discovered in England; Mr. Moore was so fortunate as to find in my presence, a short time since, two fine specimens in the Leptæna beds of the upper Lias, in the neighbourhood of Ilminster: its foreign locality being Pic de Saint Loup, near Montpellier (Herault). In the 'Prodrome,' page 220, M. D'Orbigny, besides placing this species and *L. Bouchardii* in the lower Lias, which is a stratigraphical mistake, states it not to be a *Leptæna.* It is to be regretted that, with both perfect figures of the exterior and interior, M. D'Orbigny did not assign its generic position; but both M. Bouchard and myself consider its place for the present to be best among the *Leptænas,* with which they have many similar characters.

Plate I, fig. 21, natural size.
,, fig. 21*a*, enlarged.

XVI. Leptæna Bouchardii, *Dav.* Plate I, fig. 22.

Leptæna Bouchardii, *Dav.* 1847. Annals and Mag. of Nat. Hist., pl. 18, fig. 3.
— — *Dav.* 1850. Bull. Soc. Géol. de France, vol. vi, 2de Série, p. 270. 1850.
— — ? *D'Orb.* Prodrome, 1849, vol. i, p. 220.

Diagnosis. Shell very small, almost ovular; surface smooth; large valve very convex, smaller valve concave, leaving only a little space for the animal; beak small, not much recurved; area double, and cardinal margin smaller than the greatest width of the shell; deltidium very large. Length 1¼; width about half a line.

Obs. This species is readily distinguished from *Leptæna liasiana* by its more elegant form; the small valve is more regularly concave, and the larger one more convex. When describing this species in the 'Annals,' I had not perceived that the beak was truncated at its extremity by a minute circular foramen, as in *L. liasiana;* but which numerous specimens, sent to me by Mr. Moore, have amply confirmed. This species appears never to have attained larger dimensions; as the internal characters presented by the smaller valve are those belonging to a full-grown shell. *L. Bouchardii* was found, by Mr. Moore, associated with *Leptæna Moorei,* in the Leptæna bed, previously described under that species.

Plate I, fig. 22, natural size.
,, fig. 22*a*, *b*, *c*, enlarged.

Genus—Spirifer, *Sowerby.* 1818.

Shell unequivalved, equilateral, generally transverse, more or less trigonal, and convex. Exterior rarely smooth, more often striated or costated; larger valve always convex, often gibbous, divided by a medio-longitudinal sinus, of more or less depth and width, corresponding with the mesial fold in smaller valve. Beak generally acute and straight, sometimes recurved and obtuse, never truncated, area always triangular, more or less elevated; thrown backwards, flat or concave, and divided by a mesial deltideal fissure, *always covered by a deltideum,* notched at its base, for the passage of the peduncular fibres. Smaller valve always convex, but less so than in larger valve; longitudinally divided by a mesial fold, elevated and proportioned to the sinus in larger valve, to which it corresponds. No area, summit not much developed, extending a little beyond the rectilineal cardinal edge; hinge straight, transverse, formed of two diverging teeth, limiting the base of the deltoid fissure of larger valve, and placed in the sockets existing on each side of the beak of the smaller valve; internal calcareous supports formed by two lamellæ, arising from under the beak of smaller valve, and forming a number of spiral coils, diminishing in size towards the cardinal angles.

Obs. Several divisions have been proposed in the Genus *Spirifer,* to which we will allude in our introduction, and shall only notice here, that the punctuated character believed to be peculiar to Lias Spirifers (*Spiriferina,* D'Orb.), also exists in those of other epochs. In our British Oolitic series, we are only acquainted with four species of Spirifer: viz., *Spirifer rostratus, Sp. Ilminsteriensis, Sp. Walcottii,* and *Sp. Münsterii,* all found in the lias. And on the Continent four or five more have been discovered; so that this genus, which has not yet been known higher up in the series, was represented by eight or nine forms, some of which are very similar in exterior appearance to more ancient types.

17. Spirifer rostratus, *Schl.* Plate II, figs. 1—21; Plate III, fig. 1.

Terebratulites rostratus, *Schlotheim.* 1822. Nach. Zur. Petrefact., pl. xvi.
Delthyris verrucosa, *V. Buch.* 1831. Petrifications Remarquables, pl. vii, fig. 2.
Spirifer rostrata, *Zieten.* 1832. Die versteinerungen Wurttemberg, p. 38, fig. 3.
— mesoloba, ? *Phil. Deslongchamps.* 1837. Soc. Linn. de Normandie.
— Hartmanii, *Zieten.* 1838. Die Verst Wurttemberg, pl. xxxviii, fig. 1,
— verrucosa, *Zieten.* 1838. Die Verst Wurttemberg, pl. xxxviii, fig. 2.
— pinguis, *Zieten.* (non *Sow.*) 1838. Die Verst Wurttemberg, t. xxxviii, fig. 5.
Delthyris rostratus, *V. Buch.* 1840. Class. et descrip. des Delthyris, Mém. Soc. Géol. de France, 1$^{\text{ere}}$ Série, t. iv, pl. 10, fig. 24.
— verrucosa, *V. Buch.* 1840. Class. et descrip. des Delthyris, Mém. Soc. Géol. de France, 1$^{\text{ere}}$ Série, t. 4, pl. x, fig. 30.
— tumidus, *V. Buch.* 1840. Class. et descrip. des Delthyris, Mém. Soc. Géol. de France, 1$^{\text{ere}}$ Série, t. 4, pl. x, fig. 29.

Delthyris Hartmanii, *Quenstedt.* 1843. Das Flöegibirge, Würtemberg, p. 181.
— verrucosa, *Quenstedt.* 1843. Das Flöegibirge, Würtemberg, p. 185.
— rostrata, *Quenstedt.* 1843. Das Flöegibirge, Würtemberg, p. 186.
Spirifer punctatus, *Buckman.* 1845. Geol. of Chelt., pl. 10, fig. 7.
— reticulatus, *Buckman.* (MS.)
— linguiferoides and Chiliensis, *Forbes* and *Darwin.* 1846. South America, p. 267, pl. 5, figs. 15, 16, 17, 18.
— rostratus, *Dav.* 1847. London Geol. Journal, vol. i, p. 109, pl. 18, figs. 1—10.
Spiriferina granulosa, *Rœmer* (according to *M. D'Orbigny*). 1849. Prodrome, p. 56.
— verrucosa, *D'Orb.* 1849. Prodrome, vol. i, p. 221.
— Hartmanii, *D'Orb.* 1849. Prodrome, vol. i, p. 239.
Spirifer rostratus, *Bronn.* 1849. Index Palæont., p. 1181.
— tumidus, *Coquand* et *Bayle.* 1850. Bull. Soc. Géol. de France, vol. vii, 2^{de} Série, p. 235.

Diagnosis. Shell iniquivalved, variable, rounded, with mesial fold and sinus more or less prominent; surface smooth or undulated, forming sometimes rounded plaits; beak more or less developed, recurved or straight; deltidium in two pieces, area well defined, surface of valves punctuated, and spinose extending only to the edge of the area. Three lamellæ are seen in the interior of large valve, the central one more elevated, and terminating in a point; in small valve, two spirals united together by a lamella. Length and depth very variable, the largest specimen known measuring—length 28, width 30, depth 17 lines; but the dimensions are generally much smaller, rarely extending 10 lines in length, and the same in breadth.

Obs. The numerous variations in size and form assumed by this species, does not admit of a correct description; but, through a numerous suite of specimens, we are enabled to trace the passages from one variation of form into another, all preserving a general aspect, leading to the most common type. Since 1845, I have devoted much attention to this species, having had at my disposal a great number of specimens from our British and foreign localities, it being abundantly spread in different beds of the liasic period, and a few of the most marked variations are illustrated in Plate II; and, had space admitted of it, the intermediate passages could have been traced. All the figures, excepting 18 and 19, are of the natural size; fig. 1 represents the largest specimen yet known of the species, which varies in size from the one first mentioned to that of a pea. The average dimensions and shapes are illustrated by figures 1, 2, 5, and 7.

The great variations to which this species is subject appear attributable to three principal causes:—First. The presence of a mesial fold and sinus more or less developed, or its total absence, as seen in some specimens where the front is quite straight (figs. 4 and 10); at other times only a gently elevated curve is perceptible, as in fig. 11. The large valve being regularly convex to the front, and no sinus existing, as generally happens when there is a mesial fold, more or less produced, as in figs. 1, 2, and 7. The second cause exists in the tendency there is in certain specimens to undulation, which, becoming close, often give the shell a plaited look; these, however, are not true plaits, but undulations, as in fig. 7, which is the most marked example I could find; in general they are hardly visible, and do not extend to the umbo, as in *Sp. Walcotti*, *Münsterii*, &c., and we can trace every stage, from the perfectly smooth specimen to the extreme state represented in fig. 7. The third cause is occasioned by the form of the area and beak, which is very variable in this species; generally the beak is recurved, as in figs. 1, 2, 4, 5, and 7, allowing one to see under it a deltidium of moderate size; but as the area and beak become produced and projected backwards (which is the case with many specimens), the beak becomes almost straight or slightly recurved at its extremity, and displaying in all its extent a large elongated deltidium, which is the narrower in appearance as the area becomes longer and larger. The deltidium does not thus widen in comparison to its length; it would, therefore, be impossible to separate into species this shell from the form and size of its area and beak, as every insensible gradation can be traced from one shape into another. The figures 5, 8, 10, 12 are some examples; fig. 3 exhibits a specimen, in which the beak has become very large and wide. This is a rare case, as well as that seen in fig. 10; they are extremes.

Another cause of variation is due to the punctuation and tubular spines ornamenting the valves; their size, length, and number being rarely the same in many specimens; at times being so near to each other that one cannot perceive the intermediate punctuation covering its surface; in other specimens they are irregularly and sparingly implanted, as may be seen in the enlarged fig. 19, which appearance would seem to have induced M. Buckman to propose one species for fig. 2, under the name of *Sp. punctatus*, and another for fig. 1, by the name of *Sp. reticulatus;* but in reality there is no difference between these two specimens but in the size of the punctuation and spines, which are larger and stronger, according to the size of the specimens. We also often perceive that much difference appears to have been caused by local conditions; thus we have full grown adult specimens of three lines in length and breadth, as well as in others of much greater dimensions; these form varieties in the species, and we might name *Spirifer verrucosus* of Zieten as a mere dwarf variety of *Sp. rostratus*.

The deltidium in this species is also very remarkable, being formed of two pieces united in the form of a roof, which is well displayed in many specimens, especially in those found in Normandy (Vieux pont), which I have represented in Pl. II, figs. 2, 3, and 10; leaving a passage above the umbo for the peduncular muscular fibres. When the deltidium is not preserved, which is generally the case, the fissure is seen to extend to the extremity of the beak. M. Deslongchamps, Bouchard, De Verneuil, and myself, have several specimens illustrating these points in the most beautiful manner. On both sides of the deltidium extends the area, which is well defined, dividing the beak on each side of the deltidium into two equal portions, at once perceptible by the marked line extending from the extremity of the beak along its whole length, at which line on both sides of the area the spines stop. The remaining portion to the edge of the deltidium being covered by horizontal and vertical lines of growth; the vertical lines have not, however, much length or regularity, and are well represented in fig. 10, but not generally so much indented, in most cases they are scarcely visible.

If we now separate completely the two valves, the interior will be seen as illustrated by figs. 13 and 15. In the larger valve, fig. 15, we perceive, on each side of the deltideal fissure, two teeth, which fit into corresponding sockets in the smaller valve, forming a strong hinge, so that the valves cannot be separated except by breaking one of them; they are placed at the extremity of two dental plates, projecting into the shell, forming the sides or walls of the deltideal fissure, and extending to the beak, which they strengthen (figs. 15 and 16). Between the two dental plates, a central system is interposed, variable in thickness and development, as may be seen in figs. 15, 16; beginning by a thick basis, which gradually decreases till it becomes as sharp as the edge of a knife, and projecting far beyond the lateral or dental plates (figs. 16, 21), two muscular impressions are visible between the dental and central plate. The interior of both valves is closely punctuated.

From the discovery by Mr. Moore, of specimens completely freed from all matrix, in which the most minute delicate impressions and details are preserved as intact as if the animal had just left its shell, I am able to offer a much more complete description of the small valve than that given in my paper published in the 'London Geological Journal,' (1845). This valve, separated completely from the larger one, would appear as in fig. 13; we first notice the dental sockets and position of the calcareous supports; when both valves are united they fill the greater portion of the larger valve, except where it covers the teeth and hinge, it will be seen that two lamella issue from a strong basis under the sockets which extend, diminishing in width and thickness, till they reach about the middle of the shell, where a curved lamellar process unites the two spires, but which process is rarely perceptible except when the specimens are in a perfect state of preservation (figs. 16, 21); the two lamella again continue to be directed toward the front of the shell, diverging from one another as they advance, and finally turning towards the bottom of the large valve, forming the first and successive coils, known under the name of spirals, each circle diminishing in circumference and size as it approaches the sides of the shell. The spire has been, for Mr. Moore and myself, the subject of active researches, and having found some specimens full of a very fine sand, it was preserved in great perfection, and, as may be remembered, in 1847 I mentioned the presence of spines on the spire, but at that epoch we could not offer observations as complete as at present. The lamella which forms the spire is neither smooth nor of equal thickness on all its width, differing on each side and variable, but always thicker on the inner side of the circumference than on the other which tapers out into an acute edge, and as will be seen in figs. 17, 18, the thickest part of the spire is towards its middle, where it forms a circular elevation diminishing again towards the outer edge.

It will be observed that no spines ever appear on the face of the lamella fronting the sides of the shell, or on the internal edge of the spire, as is observed in figs. 17, 18; the spines only occur in that part of the spire facing the front of the shell where it opens, covering thus only about a quarter of the circumference of each coil. These spines arising from an expanded basis are also implanted very irregularly on this portion, the calcareous matter of the lamella thickening sometimes and forming spines of different length, sometimes isolated, at other times united in clusters of two, three, and four, all directing themselves towards the exterior of the spire, and in general horizontally to it, rarely exceeding in length the width of the lamella; but in some cases they are a third longer, being of greater length and more numerous towards the centre of the spinose portion: fig. 18 illustrates a correct and considerably magnified fragment of the spire. Professor Owen thinks they are calcareous excresences destined to support the Cirri, and in this view both Viscount D'Archiac and M. De Verneuil concur; the presence of these spines only on that portion of the spine most exposed to currents, shows there was probably greater strength and development of calcareous matter required in this portion of the spire. The fact of the presence of spines, in a similar position, is common to many brachiopoda. I have seen them in *Spirifer rostratus, Walcotti Munsterii*, *Terebratula resupinata*, *Ter. pectunculoides,* &c., and in no specimens do they extend to the other portions of the spire.

The spirifer which Zieten considers to be Sowerby's *Spirifer penguis,* and figured in his plate 38, fig. 5, is from the lias of Vachengen, and seems only a variety of *Sp. rostratus,* and has much resemblance to the variety figured in my Plate II, figs. 7, 8, 9. However, the name of *penguis* would require to be dropped at any rate, because Sowerby's *Sp. penguis* is a Carboniferous shell, completely different from the Lias shell in question; M. D'Orbigny does not seem to have paid much attention to this point, as he adopts the term *penguis* for a Lias shell. The *Sp. rostratus* has a wide range in the liasic deposits, and has been found in the lower, middle, and upper lias, but chiefly in the marlstone of the middle Lias: fig. 4 is the only specimen as yet found by Mr. Moore in the upper Lias of Ilminster, and there exists no well authenticated instance of a Spirifer occurring higher up in the series in England. This species is found in many localities, such as Urn Hill, Feavington, and South Petherton, near Ilminster, near Bath, Radstock, Cheltenham, &c., and many fine specimens exist in several collections, especially that of Mr. Moore. On the Continent it is also abundantly distributed; in many parts of France, particularly in Normandy, near Caen, round Avalon, at Boll; in the Wurtemberg, near Amberg, in the Canton of Basle, &c. And M. De Verneuil has lately brought it from the province of Ferusil (Spain); it is also found in America.

18. Spirifer Ilminsteriensis, *Dav.* 1851. Plate III, figs. 7, 7*a*.

Diagnosis. Shell inequivalved, rounded, mesial fold and sinus hardly perceptible; exterior of valves smooth, punctuated, and spinose; beak of large valve much produced, projected backwards at right angles with the smaller valve; area very large, triangular. Length 2, breadth 3, depth 2 lines.

Obs. This little species was discovered by Mr. Moore, in the Leptæna or lowest beds of the upper lias, in the neighbourhood of Ilminster, and is found associated with *Thecidea rustica*, *Lept. Pearcei granulosa* and a *lingula*, which was not sufficiently perfect to be determined.

Plate III, fig. 7, represents a specimen of natural size, from the collection of Mr. Moore; 7*a* is an enlarged illustration.

19. SPIRIFER WALCOTTI, *Sow.* Plate III, figs. 2, 3.

SPIRIFER WALCOTTI, *Sow.* 1823. Min. Con., vol. iv, p. 106, pl. 377, figs. 1, 2.
TEREBRATULA — *Desh.* 1836. Nouv. ed. de Lamarck, vol. vii, p. 374.
DELTHYRIS — *V. Buch.* 1840. Mém. Soc. Géol. de France, vol. iv, 1ere Série, pl. 10, fig. 8.
SPIRIFER — *Morris.* Catalogue, 1843.
— — *Deslongchamps.* 1847. Soc. Lin. de Normandie.
TRIGONOTRATA — *Bronn.* 1847. Leth. Geog., pl. 18, fig. 14.
SPIRIFERINA — *D'Orb.* 1849. Prodrome, vol. i, p. 221.

Diagnosis. Shell inequivalved, variable, with elevated mesial fold, and four lateral rounded plaits; beak more or less recurved, area well defined, deltidium in two pieces, hinge line shorter than the width of the shell; surface punctuated and spinose; spirals and septum in the interior of both valves disposed as in *Sp. rostratus.* Dimensions variable: length of the largest specimen known 19, width 24, depth 14 lines; but, in general, the species does not attain that size.

Obs. The species is easily distinguished from *Sp. rostratus* by its mesial fold, deep sinus and plates. It was first discovered, many years ago, by Mr. Walcott, at Camerton, about six miles from Bath, and represented by him in his work on petrifactions, fig. 33. Sowerby also states that Mr. Walcott observed, of similar shells, "that those found on the upper Bristol road, near Bath, are smaller, their shell thin, with a triangular hole between the beak of the lower valve and the hinge, and have the body, fig. 33, A B, within them; it consists of two hollow cones, joined to each other by part of their basis, and to one of the valves, but not so close as to prevent the animal, or part of it, from retreating into them: their surfaces are beautifully covered with circular rows of small pyramids of spar." Thus, as Mr. Sowerby observes, in vol. iv. p. 106, of his 'Min. Conch.,' Mr. Walcott was the first discoverer of the spiral appendages, long before they were used as a generic character; he also observed the triangular fissure, but did not understand the nature of the spirals or their use, and it is but just, in treating of this species, to state, that on it those important calcareous appendages were first noticed. It is a very variable shell, as may be seen in Plate III, figs. 2 and 3, is abundantly spread in the lower Lias, and more sparingly in the middle Lias; it is common near Radstock and Bath. Fig. 2 illustrates the largest specimen which I have observed, and which was found there by Mr. Moore; it is also met with in France, in Burgundy, and in many other localities on the Continent.

20. Spirifer Münsterii, *Dav.* 1851. Plate III, figs. 4, 5, 6.

Spirifer octoplicatus, *Zieten.* (non *Sow.*) 1832. Die Verst. Wurttemb., pl. 38, fig. 6.
— — *Dav.* 1847. London Geol. Journal, pl. 18, figs. 11—14.
Spiriferina — *D'Orb.* 1849. Prodrome, vol. i, p. 221.

Diagnosis. Shell inequivalved, variable, with elevated rounded mesial fold in small valve, with corresponding sinus in larger one, with four, five, or six plaits on each side of the mesial fold and sinus; beak more or less produced or recurved, elevated or projected backwards; area well defined, with deltidium in two pieces; interior of both valves similar to that seen in *Sp. rostratus*, *Walcottii*, &c.; surface punctuated and spinose. Dimensions variable, the largest specimen known measuring—length 15, width 14 lines, but commonly does not attain that size.

Obs. Many persons, as well as myself, have fallen into the error of attributing this species to *Spirifer octoplicatus*, of Sow., M. C., vol. vi, table 562, figs. 2, 3, 4, 1829, which name was given by that author to a Carboniferous species, much resembling our Liasic one. Zieten appears to have principally led to this mistake, (Die Vers. Wurt., 1832,) and it has also been referred by some Palæontologists to *Spirifer acuticostatus*, a name given by Münster to a shell in the collection of Beyruth, and reproduced by Bronn, along with many others, in 1840, without description or figures, so that it is impossible to say what shell was intended, and no species can be admitted on such uncertain grounds. In 1844 this name, accompanied by a figure and description, was given by M. de Koninck to a mountain limestone species, which name Bronn places first, in page 1172, of his 'Index Palæontologicus.' *Spirifer Münsterii* is a very variable shell, as may be seen from three specimens in Plate III, and is found along with *Sp. rostratus* in the marlstone of Ilminster, and in many localities abroad, such as Fontaine-étoupe-Four, near Caen, &c. Plate III, fig. 4, illustrates the largest specimen I have seen, found by Mr. Moore, near Ilminster; figs. 5 and 6 is the common state in which it occurs. It much resembles *Spirifer cristatus* of the Permian deposits: the tubular spines which cover its surface are stronger, and considerably more numerous, than those observable in *Sp. rostratus*. They are also visible on the portion of the spine facing the front, as in the above-mentioned species.

Genus—Terebratula, *Lhwyd.* 1698.

Shell inequivalved, equilateral, more or less elongated, transverse or circular; exterior smooth, rarely striated or plicated; *larger valve* convex, except in *Ter. Eugenii*, where it is depressed or slightly concave; with or without a sinus, corresponding to a mesial fold in smaller valve, front straight or sinuated; beak straight or recurved and produced, always truncated by an apicial, emarginate, or entire foramen, of a circular or elongated shape, variable in its dimensions, and more or less separated from the umbo by a triangular deltidium in one or two pieces, the foramen being surrounded by the substance of the larger valve and deltidium; no true area; lateral beak, ridges undistinct, short, recurved to join the hinge margin, or continued along the sides of the shell without recurving, in which last case there commonly exists between it and the hinge a flatness or false area. *Smaller* or imperforated valve convex or concave, with or without a longitudinal mesial fold; hinge composed of two teeth in the larger valve, which articulate with corresponding sockets in smaller one, so that the valves cannot be separated without fracturing one of the teeth; internal ribbon-shaped lamella, (partly supporting the ciliated arms,) attached only to crura, short or elongated, and more or less folded back on itself; animal fixed to submarine bodies, by muscular fibres passing through the foramen, structure perforated.

Obs. It has been proposed to divide the genus Terebratula according to the length of the loop, which will be referred to in our Introduction.

We have admitted forty species of British Oolitic *Terebratulæ*, which can, we believe, be conveniently retained, although, strictly speaking, many species pass one into another, by some one or more common characters.

In the following table we have arranged these species into two sections, those with a loop extending to near the frontal margin, and those in which the process does not attain, or exceed, half the length of the shell; no external characters, however, seem to denote if the loop be long or short, and we have placed a point of interrogation before those species in which we have not actually seen it, but where, from observations or indication, we believe it to be so.

1st SECTION. ***Loop*** **simply attached to crura, and extending to near the frontal margin.**	**Beak laterally compressed, carinated; beak ridges continued along the sides without recurving to join the hinge margin; surface smooth.**		**Terebratula**	**quadrifida.**
			—	**cornuta.**
			—	**Edwardsii.**
		?	**—**	**Waterhousii.**
			—	**resupinata.**
			—	**Moorei.**
			—	**impressa.**
			—	**carinata.**
		?	**—**	**emarginata.**
		?	**—**	**Waltonii.**
			—	**numismalis; *var.* subnumismalis.**
	Beak uncompressed laterally; beak ridges soon becoming indistinct, or recurved to join the hinge margin; surface smooth.	**?**	**—**	**Bakeriæ.**
			—	**digona.**
			—	**obovata.**
			—	**ornithocephala.**
			—	**lagenalis.**
			—	**sublagenalis.**
	Surface plicated.		**—**	**cardium.**

2d SECTION.

Loop simply attached to crura, and extending to less than half the length of the valves.

Beak uncompressed laterally, beak ridges soon becoming more or less indistinct; surface smooth or incompletely plicated.

Terebratula punctata.
— subpunctata.
— indentata.
? — Buckmanii.
? — Lycettii.
— insignis.
? — simplex.
? — ovoides.
— maxillata; *var.* submaxillata.
— perovalis.
— intermedia.
— Phillipsii.
— globata.
— bucculenta.
— sphæroidalis.
— globulina.
— pygmia.
? — Bentleyii.
— coarctata.
— plicata.
— fimbria.
— flabellum.

21. TEREBRATULA QUADRIFIDA, *Lamarck*. Plate III, figs. 8—10.

TEREBRATULA QUADRIFIDA, *Lamarck*. 1819. Anim. sans Vertebres, vol. vi, p. 35.
— — *Deslongchamps*. Soc. Lin. de Normandie, 1837.
— — *V. Buch*. Mém. Soc. Géol. de France, vol. iii, p. 190, pl. xvii, fig. 3, 1838.
— — *Bronn*. 1849. Index Palæont., p. 1247.
— — *D'Orb*. 1849. Prodrome, p. 240.
— — *Dav*. Annals and Mag. of Nat. Hist., vol. v, 2d Series, pl. xiv, fig. 35. (*Notes on an examination of Lamarck's Fossil Terebratulæ.*)

Diagnosis. "*Testa triangulari-depressâ, dilatatâ lævi superne quatuor angulis acutis instructâ, nati brevi.*" (Lamarck.)

Shell inequivalved, broader than long, irregularly pentagonal, depressed, variable; valves almost equally and slightly convex, with four rounded ridges, extending from the umbo and beak to the front, and three corresponding sinuses on each valve; the hinge margin is convex, extending to a considerable distance, and forming nearly half the circumference of the shell, the remaining portion being well nigh equally divided into three concave portions; beak small, with acute lateral ridge, continued along the side, without recurving to join the hinge-margin, forming a well-defined marginal and false area; beak slightly compressed, foramen entire and of moderate size, separated from the umbo by an obtuse triangular deltidium in two pieces. Loop of imperforated valve simply attached to the crura, and extending to near the internal frontal margin; impressions of the posterior divisions of the valvular muscles strongly marked, valves minutely punctuated and marked by numerous lines of growth. Dimensions variable, average length 14, width 18, depth 7 lines.

Obs. This species appears to have been first described and named by Lamarck, it has been long known as a characteristic liasic species, and, as is the case with most brachiopoda, it varies considerably in shape, and, in my opinion, passes by insensible graduations into the next form distinguished by Sowerby under the name of *Ter. cornuta.* Some specimens are so irregular that one half would present the characters of *quadrifida,* while the other has those of *cornuta.* In England the type forms of *quadrifida,* are much more rare than those of *cornuta,* and seem to pass into each other's type more than similar shells on the Continent, and especially in Normandy, where both appear more distinct and permanent in their character; therefore, to meet the wishes of the generality of Palæontologists, both names are preserved, and the following may be given as distinctive characters. *T. cornuta* is deeper, more convex, and longer than it is wide, the reverse of what we generally find in *quadrifida,* which is wider than it is long, flatter and much less deep, the beak and area are also larger and more produced in *T. cornuta.* Both species, or more properly speaking, in my opinion, varieties of one type, they are found together in the same beds and localities, but in some places one or the other form prevails. In Plate III will be seen illustrations of both forms, as found in England; figs. 8, 9, 10 represent *Ter. quadrifida,* while 11—18 illustrates *Ter. cornuta.* *Ter. quadrifida* is usually found in the marlstone or middle lias, and particularly at South Petherton, near Ilminster, where Mr. Moore procured many specimens, but I have not seen any as large or as fine as those of Normandy, Vieuxpont, Landres, and Evrecy, near Caen; M. D'Orbigny states their occurrence at Saint-Amand (Cher.), and Nancy, in France. Figs. 8—9 are from Mr. Moore's collection.

22. TEREBRATULA CORNUTA, *Sow.* Plate III, figs. 11—18.

TEREBRATULA CORNUTA, *Sow.* Min. Conch., 1825, vol. v, p. 66, pl. 446, fig. 4.
— VICINALIS, *V. Buch.* 1838. Mém. Soc. Géol. de France, vol. iii, p. 192, pl. xvii, fig. 5. (Non *T. vicinalis,* Schloth., according to M. D'Orbigny.)
— CORNUTA, *Morris.* Catalogue, 1843.
— — *Bronn.* 1849. Index Palæont., p. 1233.
— — *D'Orb.* Prodrome, 1849, vol. i, p. 240.

Diagnosis. Shell inequivalved, irregularly pentagonal, generally longer than wide; valves almost equally convex, thick and deep; hinge-margin forming nearly half the circumference of the shell, the remaining portion and front being divided into three more or less defined concave curves, the central or frontal one in common deeply indented, but obscurely so laterally, the surface of both valves are smooth and shining; three concave sinuses, forming two elevated rounded ridges, visibly diverging from the umbo towards the front, but which only begin to rise above the level of the shell towards the anterior portion, increasing as they approach the frontal margin; beak large, more or less recurved, with lateral ridges continued along the side of the valve, without recurving, to join the hinge-margin, forming a defined marginal area; beak slightly compressed and keeled, truncated by an entire foramen of moderate size; deltidium in two pieces, more or less hid by the recurving of the beak; loop free, attached merely to the crural base, and extending to near the internal frontal margin; valves finely punctuated, and strongly marked by numerous lines of growth. Dimensions and form variable, length 20, width 13, depth 12 lines.

Obs. When treating of *Ter. quadrifida,* I expressed how intimately I believed it was connected with the present form, and stated what distinctions could be brought forward to characterise both; it is a very common shell in the middle Lias, both of England and France, found abundantly at South Petherton, and near Cheltenham, where it varies considerably in form, as may be seen from the illustration, Plate III, figs. 17, 18. The usual type approaching more or less to figs. 13, 16, and 21; 11, 14, 15 being exceptional forms. The largest specimen I have seen in England, measuring 21 lines in length and 18 in breadth, belongs to the collection of the British Museum. We are indebted to Mr. Moore for the working out of the fine interior illustrating this species.

23. TEREBRATULA EDWARDSII, *Dav.* Plate VI, figs. 11, 13, 14, and 15?

Diagnosis. Shell inequivalved, globose, more or less circular, as wide as long, straight in front; valves convex, sometimes globose, and distinctly emarginated; beak much recurved, and truncated by a small foramen advancing over the umbo, almost touching it, so as to conceal the deltidium, which is rarely visible; lateral ridges extending along the sides of the shell, without recurving to join the hinge margin; surface smooth, finely punctuated; loop extending to near the margin of the shell, and simply attached to Crura. Length 15, width 13, depth 10 lines.

Obs. This species may be distinguished from both *T. punctata* and *subpunctata* by the shortness and squareness of its shape, as well as by its strongly recurved beak, lateral ridges, smaller foramen, and length of loop, which last fact is due to Mr. Moore's exertions, who, after much trouble, was enabled to clear the process, seemingly identical with that of *T. cornuta,* to which shell it approaches by many characters, though quite distinct by the roundness of its sides and square front; in some specimens, as in *T. subpunctata,* we perceive a flatness at the umbo, see figs. 11 and 11*a,* due to compression when young. *Ter. Edwardsii* is found along with *Ter. subpunctata, cornuta resupinata,* &c., in the marlstone of South Petherton, near Ilminster, and it gratifies me highly to name it after the learned Dean of the French Academy of Sciences. It is with hesitation I have placed here a solitary specimen, Plate VI, fig. 15, the shape of which is doubtless due to deformity. Fig. 11, in Mr. Walton's collection; 11—16, from that of Mr. Moore.

24. Terebratula Waterhousii, *Dav.* Plate V, figs. 12, 13.

Diagnosis. Shell inequivalved, longer than wide; imperforated valve convex; beak small, rounded, and truncated by an entire foramen, with acute lateral ridges continued along the sides, without recurving to join the hinge line; deltidium in two pieces; imperforated valve convex, except towards the front, where there is a concave depression, distinctly bent downwards, giving the frontal line an indented appearance; loop attached only to the crura, and extending to near the frontal margin of the shell. Length 9, width 7, depth 6 lines.

Obs. This species, although distinct, comes near to *Ter. cornuta* by the form of its beak, approaching those varieties in which the lateral prominence is not developed; it differs, however, in having the front distinctly bent downwards, as is seen in Plate V, figs. 12*a*, 13*a*. Its greatest thickness is about the umbonal portion; it varies much in form and shape, as may be perceived by comparing fig. 12 with fig. 13. *Ter. Waterhousii* belongs to the upper portion of the middle Lias, and was first found by Mr. Walton and myself at Farington Gurney, near Radstock, along with *T. numismalis rimosa*, &c. Dr. Krantz, of Bonn, sent me specimens of this species from Bonfingen, in Wurtemberg, in which locality this shell acquires larger dimensions than those as yet found in England.

25. Terebratula resupinata, *Sow.* Plate IV, figs. 1—5.

Terebratula resupinata, *Sow.* Min. Conch., 1818, vol. ii, p. 116, t. 150, figs. 3, 4.
— — *Desh.* 1836. Nouv. ed. de Lamarck, vol. vii, p. 360.
— — *Pusch.* Polens Palæontologie, 1837, tafal iv, fig. 6.
— — *Phillips.* Geol. of Yorkshire, pl. xiii, fig. 23, 1835.
— — *Deslongchamps.* 1837. Soc. Linn. de Normandie.
— — *V. Buch.* Mém. Soc. Géol. de France, 1838, p. 229, pl. xx, fig. 11.
— — *Morris.* Catalogue, 1843.
— — *Bronn.* Index Palæont., 1849, p. 1248.
— — *D'Orb.* Prodrome, 1849, vol. i, p. 239.

Diagnosis. Shell inequivalved, oblong, longer than broad; rostral valve convex, much compressed and keeled; beak small and incurved, almost touching the umbo, lateral ridges acute and continued along the side, without recurving to join the hinge margin, false or marginal area increasing in width at some distance from the beak; foramen entire, remarkably small, with a wide obtuse deltidium, in two pieces, rapidly decreasing as it approaches the small foramen, which it partly encircles. Imperforated valve, laterally convex, with a deep central longitudinal groove and depression, extending from the umbo to the front, which is considerably curved backwards and depressed. The marginal line is straight or gently curved on leaving the hinge, till it attains about two thirds of the length of the shell, when, turning suddenly backwards by a rapid curve, it produces a considerable angle to the first portion of the line and acute frontal depression.

Loop in smaller valve simply attached to the crura, and extending to near the frontal margin; the inner side of the lamella, facing the opening of the valves, is irregularly covered with spines, similar to those observable on the spine of *Sp. rostratus* and loop of *Ter. pectunculoides*, &c.; the outer side facing the sides of the valve is smooth, and always without spines.

Valves smooth, finely punctuated, and marked by numerous lines of growth. Dimensions and form variable; length 16, breadth 14, depth 12 lines.

Obs. Many shells have been attributed to Sowerby's *Ter. resupinata,* apparently not belonging to the type of that author, established on a liasic shell, answering to the above description. It is, however, no easy matter, indeed scarcely possible, to give an accurate description of any species agreeing with all the shells it includes, from the innumerable variations they constantly present, especially in some species which pass into one another in the most perplexing manner; so much so, that certain characters are diminished in value from their irregularity. It is indispensable to give distinct names to certain forms, which in reality merge from one type into another, but would be incomprehensible or difficult to remember, if we were compelled to give a long and interminable list of varieties, with distinct denominations added to the typical name. The *Resupinata* group, for instance, presents endless variety in form, most difficult to characterise, and especially so when we have before us a great number of specimens. Sowerby's type is distinguished from the other members of the group by its small elevated and recurved beak, diminutive foramen, and strongly laterally compressed and keeled rostral valve, more especially so towards the beak, which character seems peculiar to some of the liasic species. The depression and longitudinal groove of the imperforated valve, which is strongly marked in this form, varies to so great a degree, that, on a large assemblage of specimens, we trace passages into the next species or variety, *Ter. Moorei,* where, instead of the depression visible in the type *Ter. resupinata,* we find the imperforated valve completely convex and gibbous; so much so, that the longitudinal furrow disappears, and, becoming sensible only towards the frontal portion; the larger valve presents likewise a slight longitudinal depression towards the front, corresponding with that visible in the other valve, never seen in Sowerby's type of *resupinata;* the margin line of the two valves is also nearly straight all round, so that it would be difficult to recognise the original type of *Ter. resupinata* in *Ter. Moorei,* had we not before us a number of specimens illustrating the gradual passage. *Ter. carinata, Ter. impressa,* and other forms, which, though nearly allied and belonging to the same group, should at least, for convenience, be considered as specifically distinct, as they in general vary enough to be easily distinguished. It is to Mr. Moore we owe the discovery of the first specimen, showing spines on the inner side of the calcareous loop, facing the frontal opening of the shell, and which I subsequently recognised to be peculiar to several species. *Ter. resupinata* is abundantly found in the marlstone beds of the middle Lias, associated with *Ter. quadrifida, cornuta, Moorei*, &c., at South Petherton, near Ilminster; at Deddington it was found by Mr. Faulkner, and is stated to occur in Yorkshire by Professor Phillips. In France it is abundantly found at Evrecy, Landes, Fontaine-étoupe-four, &c., near Caen, and I believe also in Germany, though none of the numerous specimens I have seen from that country agree exactly with Sowerby's type. Figs. 1 and 2 are from the collection of Mr. Moore.

26. TEREBRATULA MOOREI, *Dav.* Pl. IV. Figs. 6, 7.

TEREBRATULA MOOREI, *Dav.* Bull. Soc. Géol. de France, 2^{de} Série, t. vii., pl. 1, figs. 21—23.

Diagnosis.—Shell ovate, elongated, slightly notched in front; valves convex of a nearly equal depth, smooth, finely punctuated, with strong lines of growth. The imperforated valve presenting a slight longitudinal depression visible at the umbo, soon lost from the convexity of the valves, but reappearing towards the front. Rostral valve convex with small recurved beak, compressed laterally and keeled, with diminutive foramen; a slightly longitudinal depression is visible towards the front. The margin is straight, almost all round. Loop simply attached to the Crura and extending to near the frontal margin. Length 18, breadth 14, depth 11 lines.

Obs. When treating of *Ter. resupinata* we endeavoured to point out the affinities and distinctive characters between the two forms. This species is found in the marlstone of South Petherton, along with *T. resupinata.* It also occurs in beds of the same age in Normandy. Fig. 6 is from the collection of Mr. Tennant.

27. TEREBRATULA IMPRESSA, *V. Buch.* Pl. IV, figs. 8—10. Pl. X, figs. 7, 7*a b c.*

TERABRATULA IMPRESSA, *De Buch.* Zieten Würtemb. Verst., p. 53, pl. xxxix, fig. 11, 1832.
— — *Bronn.* 1837. Leth. Geog., p. 306, pl. xviii, fig. 12.
— — *V. Buch.* Mém. Soc. Géol. de France, 1^{ere} Série, p. 226, pl. xx, fig. 7, 1838.
— — *Quenstedt.* Das Flözgebirge Wurtembergs, 1843.
— — *Bronn.* Index Palæont., 1849, p. 1238.
— — *D'Orb.* Prodrome, vol. i, p. 288, 1849.

Diagnosis. Shell inequivalved, more or less rounded, length and width nearly the same; rostral valve convex with rounded recurved beak, foramen entire, deltidium in two pieces obtusely triangular: lateral ridge of the beak continued along the side without recurving to join the hinge margin. Imperforated valve, slightly convex at the umbo; but soon becoming gently and equally depressed; the marginal line of both valves forming a regular depressed curve soon after leaving the hinge line. Loop simply attached to Crura and extending to near the frontal margin of the valve. Surface finely punctuated; length and width from 9 to 10 lines, depth 5.

Obs. This species is generally distinguished from *T. resupinata* and *carinata* by its more circular form, the depression in the anterior portion of the smaller valve is less deep and relatively broader, and more regularly curved; the lateral ridges of the beak are not extended so much in the longitudinal direction, the beak being rounder and not much compressed. Such are the distinctions observable in well characterised specimens of *Ter. impressa* found abundantly in the Oxford Clay of several parts of England, as at St. Ives, in Huntingdonshire; and in similar beds near Boulogne-sur-mer. We also find in the Inferior Oolitic beds of Cheltenham, a shell connecting *Ter. impressa* with *T. resupinata*, but which, from the size of its foramen and more circular shape, is more properly associated with *Ter. impressa;* and I perceive in the 'Prodrome,' M. D'Orbigny places this last-named species in the Inferior Oolite, or his *Terrain Bajocien*, but omits it in the Oxford Clay, where the type form of the species occurs. The similarity of some of the specimens from Cheltenham to those of the Oxford Clay is so striking, that I would not even venture to give this variety a distinctive name, as some specimens of *Ter. impressa* may be seen in Pl. IV, fig. 9, to have a lengthened shape instead of a short circular form peculiar to the generality of the impressa tribe. In Germany this shell is so abundant that local geologists have distinguished the bed containing them by the name of *Impressa-thorn:* here likewise we find a small difference in the aspect of the shell, which seems to me owing more to local causes than to any specific differences. These German shells are not commonly quite so deep; the smaller valve is a little less convex posteriorly than what is usually seen in those from the Oxford Clay.

Another small race, or variety, Pl. X, fig. 7, is found in the Inferior Oolite of Sherborne, Dorsetshire, which links *Ter. resupinata* to true *T. impressa;* we place it with the last-named species from the characters of its beak; as none of the species related to the *T. resupinata* group, hitherto found in the Oolites, have that small laterally pinched and recurved beak, or diminutive foramen so peculiar to the liasic species; a character any one would perceive who had observed a series of specimens from the two deposits. I have come to the above conclusion after a thorough examination of many hundreds of specimens, nor should I think myself justified in distinguishing these varieties by distinct names.

Ter. impressa is abundantly found in Germany, especially in Wurtemberg.

Plate IV, figs. 9 and 10, are type specimens of the species from the Oxford clay, in possession of Mr. Morris.

,, fig. 8, var. from the Inferior Oolite of Cheltenham, from a specimen in Dr. Wright's Collection.

Plate X, fig. 7, a var. from the Inferior Oolite of Sherborne, in the Collection of the British Museum.

,, fig. 7*a b c* are enlarged illustrations.

28. Terebratula carinata, *Lamarck.* Plate IV, figs. 11—17.

Terebratula carinata, *Lamarck.* Anim. sans. Vert., vol. vi, p. 25.
— — *Tennant.* 1847. Stratigraphical List of British Fossils, p. 73.
— — *Bronn.* 1849. Index Palæont., p. 1232.
— — *Dav.* 1850. Lamarck's Species of Fossil Terebratulæ, Ann. and Mag. of Nat. Hist., vol. v, 2de Série, pl. xiii, fig. 25.

Diagnosis. "*T. testá subquadrangulari lævi; valvá inferiori subcomplanatá superiore diedrá medio-carinatá.*"—(Lamarck.)

Shell inequivalved, oblong, longer than wide, smooth, surface punctuated. Perforated or rostral valve convex with slightly recurved beak, lateral ridges continued along the sides without recurving to join the hinge margin, foramen of moderate size, entire and separated from the umbo by a rather long deltidium in two pieces; imperforated valve regularly and gently compressed almost from the umbo; front sometimes considerably thickened. Loop long and attached only to Crura: average dimensions; length 13, width 9, depth 5 or 6 lines, some specimens measuring, length 20, breadth 17, depth 10 lines.

Obs. This species, established by Lamarck, in 1819, is distinguished from *T. resupinata* by its rounder and less recurved beak, larger foramen generally separated from the umbo by a greater distance and larger deltidium: it is also flatter and is a more elongated shell. The depression of the imperforated valve is not the same in all specimens, some such as those figured 13, 14, from Mr. Bowerbank's Collection, are almost convex, presenting a depression only towards the front. The thickening or emargination of the valves is very great in some specimens, as may be observed in fig 12, preserved in the Collection of the Geological Survey. This species occurs in the Inferior Oolite near Stroud, Burton Radstock, Dinnington, &c.; and fine specimens are to be seen in the Collections of Messrs. Bowerbank, Morris, Moore, Walton, &c. In France it is found in the Inferior Oolite round Caen in Normandy. In the Inferior Oolite of Chalford, near Stroud, and Crichley Hill, near Cheltenham, a very wide and large variety of this species is found; figs. 15, 16, and 17, remarkable from the size of its foramen; the lateral ridges are also much nearer to the umbo and thrown off from the fore part of the beak opening. I do not believe we could be justified in separating this variety from *T. carinata*, as the above distinctions are not permanent, but varying in many specimens. Of this variety many fine specimens are to be seen in the British Museum, as well as in the Collections of Messrs. Morris, Buckman, Dr. Wright, &c.

29. Terebratula emarginata, *Sow.* Plate IV, figs. 18—21.

Terebratula emarginata, *Sow.* Min. Con., 1825, vol. v, p. 50, pl. 435, fig. 5.
— — *Deslongchamps.* 1837. Soc. Linn. de Normandie.
— — *Morris.* 1843. Catalogue.
— — *Bronn.* 1849. Index Palæont., p. 1236.
— — *D'Orb.* 1849. Prodrome, vol. i, p. 287.

Diagnosis. Shell inequivalved, subrhomboidal short and broad; when adult notched and indented in front, perforated valve convex, beak slightly recurved, foramen separated from the umbo by a deltidium in two pieces, front defined by two angles or emarginate edge, imperforated valve flat or slightly convex, sometimes depressed longitudinally towards the front; smooth, punctuated and marked by strong lines of growth. Loop long, and attached only to the Crura. Length 11, breadth 10, depth 6 lines.

Obs. The above description agrees with that given by Mr. Sowerby; it is a very variable shell: the flatness of the imperforated valve seems to be one of its principal characters. Some specimens are however slightly convex; it approaches near to *T. carinata,* but is a shorter and wider shell, rarely presenting any of the longitudinal depression common to *Ter. resupinata* and *T. carinata,* forming one of the transition shapes connecting the resupinata tribe, with a depressed imperforated valve to those species in which the same valve is convex, such as *Ter. Waltonii.* In Pl. IV, figs. 18, 19, 20, I have given the original specimens figured in the 'M. C.,' kindly lent me by Mr. J. de C. Sowerby; fig. 21 belongs to Mr. Tennant's Collection, and shows an unusual deep longitudinal furrow. This species belongs to the Inferior Oolite, and is stated to come from Nunney, near Frome. Five specimens are preserved in the British Museum, collected by Mr. Cunnington. It occurs also on the Continent, especially in Normandy, as noticed by M. Deslongchamps.

30. TEREBRATULA WALTONII, *Dav.* Plate V, figs. 1—3.

Diagnosis. Shell inequivalved, more or less oval; valves convex, beak produced, rounded, truncated by an entire foramen, separated from the umbo by a rather long deltidium in two pieces; lateral ridge of beak continued along the side, without recurving, to join the hinge margin. The margin line of valves nearly straight all round; front and sides emarginate; surface smooth, finely punctuated; very variable in form and dimensions: with the same depth of 8 lines, the three specimens figured from the Collections of Messrs. Walton and Tennant gave a length of 18, 18, 13, breadth 11, 13, 11 lines.

Obs. This species is from the Inferior Oolite of Bathwick Hill, Bath and Burton. The loop is unknown, but must have been simply attached to the Crura, and extended to near the frontal margin. The emargination of most specimens of this species is very remarkable, as well as the regular and almost equal convexity of the valves. It will take place next to *T. emarginata,* to which it is most nearly allied. I name it after Mr. Walton, of Bath, who has kindly afforded me frequent assistance in this work.

31. TEREBRATULA NUMISMALIS, *Lamarck.* Plate V, figs. 4—9.
Var. SUBNUMISMALIS, *Dav.* Fig. 10.

TEREBRATULA NUMISMALIS, *Lamarck.* 1819. Anim., sans Vert., vol. vi, No. 22.
— COR. *Valenciennes* in *Lamarck,* 1819, An. sans Vert., vol. vi, No. 22.

TEREBRATULA NUMISMALIS, *Zieten.* 1832. Würtemb. Verst., pl. xxxix, fig. 4.
— ORBICULARIS, *Zieten.* 1832. Würtemb. Verst., pl. xxxix, fig. 5.
— NUMISMALIS, *Bronn.* Leth. Geog., pl. xviii, fig. 8.
— — *Deslongchamps.* 1837. Soc. Linn. de Normandie.
— — *V. Buch.* 1838. Mém. Soc. Géol. de France, vol. iii, 1^{ere} Série, p. 191, pl. xvii, fig. 4.
— — *Bruyere.* Ency. Meth., p. 240, fig. 1.
— *Quenstedt.* 1843. Das Flös. Wurt., pp. 183, 184.
— — *D'Orb.* Prodrome, vol. i, p. 240, 1849.
— — *Dav.* 1850. Lamarck's Species, Annals and Mag. of Nat. Hist., vol. v, 2^{de} Série, pl. xiii, fig. 17, and pl. xv, fig. 22.

Diagnosis. "*T. testá subrotundá lævi, utraque valvá superne sinu instructá: striis concentricis remotis: nate brĕvi: foramine minimo.*"—(Lamarck.)

Shell inequivalved, depressed, nearly circular or slightly pentagonal, notched in front, variable in its contour; valves nearly equally convex, much depressed and flattened, surface smooth, the margin of valves forming almost a straight line; beak slightly compressed and keeled, lateral ridges of beak continued along the side, without recurving, to join its margin; false area, very small and well defined; deltidium in two pieces, wide at the umbo, diminishing as it reaches the foramen, which is entire and remarkably small. Sometimes a slight central depression or sinus is visible on each valve; lines of growth strongly marked, punctuation very fine. Loop free, attached only to the crural base, and extending nearly the whole width of the shell; mesial plate well defined. Length and width on an average nearly the same, from 11 to 13 lines, depth from 4 to 6.

Obs. This species was first brought into notice by Lamarck, who pointed out its extremely small area and foramen; it is easily distinguished from all other liasic and oolitic Terebratulæ by its extreme flatness. Lamarck and Valencienne's *Ter. cor.*, as I stated in the 'Annals of Natural History,' of June, 1850, is a synonym of this species, established on a specimen bearing accidentally the shape of a heart, and is only one of the numerous variations in contour, observable in *Ter. numismalis,* as may be seen from some of the forms illustrated in Plate III, figs. 4—9. This species is very abundant in the highest beds of the middle and upper Lias, and it is only within a few years that it was discovered in England, in the neighbourhood of Cheltenham, where the specimens have a dark grayish colour. Mr. Walton and I found it two years ago in the neighbourhood of Radstock, and at Farington Gurney, where they are yellowish, owing to the colour of the clay in which they are imbedded; and many fine specimens are to be seen in the Collections of Dr. Wright, Professor Buckman, and others. It was also obtained by Mr. Hugh Miller, from the Lias of Shendwich, in Scotland. Plate V, fig. 8, illustrates a specimen from that locality. In France it is very common, about Eurecy, Landes, Vieux Pont, St. Armand, Pouilly, Avallon, Lyon, &c., where larger and finer specimens than any of our British ones have been found, and they may be viewed in the Collections of M. Deslongchamps, of Caen, who kindly lent me the specimens illustrating the internal loop, figured in Plate V, fig. 9. It is also abundant in Germany, and Von Buch gives the following localities: on the Plienback, near Boll, near Eslingen, at Blattenhardt, Denchendorff, Gönningen, and between Tübingen and Hechingen, at Eley, near Brunswick, &c.

Var. Subnumismalis. Fig. 10.

I have placed here, with some doubts, as a variety, the only specimens of a shell found by Mr. Moore in the marlstone of Ilminster, from having observed, in the collection of the Ecole de Mines, in Paris, specimens of undoubted *numismalis*, much approaching this in shape. Its beak and foramen are, however, so much larger than that characteristic of *true numismalis*, that, as is above stated, I am not certain of its belonging to *numismalis*, but do not like to make a species formed on the observation of a single specimen.

32. Terebratula Bakeriæ, *Dav.* Plate V, fig. 11.

Diagnosis. Shell inequivalved, broader than long; rostral valve moderately convex; beak small; lateral ridge rounded and indistinct; foramen entire, nearly touching the umbo; imperforated valve less convex, with front rather suddenly bent downwards in the middle, so as to present a semicircular figure; the frontal depression is continued along the small valve to the centre, but becomes gradually shallower towards the umbo. Surface smooth, finely punctuated. Length 4, breadth 5, depth $2\frac{1}{2}$ lines.

Obs. This little shell approaches in form to *Ter. nucleata*, but has not so incurved a beak, and appears much less deep. *Ter. Bakeriæ* is stated to have been found in the Inferior Oolite of Bugbrook, by the late Miss Baker, and is now preserved in the Collection at the British Museum.

33. Terebratula digona, *Sow.* Plate V, figs. 18, 24.

Terebratula digona, *Sow.* Min. Con., 1812, vol. i, p. 217, tab. 96, figs. 1—5.
— — Ency. Meth., pl. 240, fig. 5.
— — *Lamarck.* 1819. Anim. sans Vert., vol. vi, No. 19.
— — *Deslongchamps.* 1837. Soc. Linn. de Normandie.
— — *Smith.* Stratigraphical System of Organised Fossils, 1816, 1817.
— — *V. Buch.* 1838. Mém. Soc. Géol. de France, vol. iii, p. 194, pl. xvii, fig. 6.
— — *Morris.* Catalogue, 1843.
— — *Bronn.* 1849. Index Palæont., p. 1235.
— — *D'Orb.* 1849. Prodrome, vol. i, p. 315.

Diagnosis. Shell inequivalved, more or less triangular, oblong; valves convex;

marginal line nearly straight, front more or less convex or concave, bounded, when old, by two prominent angles alike in each valve, as if produced by the pinching of the edge; beak produced, rounded, truncated by an entire foramen, separated from the umbo by a somewhat long triangular deltidium in two pieces; lateral ridges not continued to a great distance, there existing a strongly-marked lateral flatness, the greatest width of the shell being generally, though not always, at the front; surface smooth, finely punctuated; loop attached only to the crura, and extending to near the margin of the shell. Dimensions and form variable; average size, length 13, width 9, depth 8 lines.

Obs. This is one of the first-described species in the Min. Con., and long known as a characteristic oolitic fossil, and is stated by Sowerby, p. 217, to be "*variable in its form*, sometimes almost globose, at others acutely triangular and rather depressed; the two angles of the front are continued a little along each valve, and look as if they were produced by pinching the edges between the fingers; the front between the angles is in some shells concave, in others straight, or of different degrees of convexity." Von Buch's description of this species would lead us to imagine that the greatest width of the shell was always in front, since he states and underlines "Les arêtes Cardinales descendent en divergeant d'une manière continue vers les côtes, et remplacent tout à fait les arêtes laterales, on autrement dit ne convergent pas, mais descendent verticalement de sorte que la *largeur du front est en même temps la plus grande largeur de la coquille*." Though this is the general distinguishing character of digona, it often varies, as I have shown from the original figures of the species, from Smith's Collection, deposited, in 1816, in the collection of the British Museum, thus often approaching, in general form and convexity, to certain specimens of *Ter. obovata*, but in all its varieties *T. digona* may be distinguished by the lateral beak ridge not being recurved to join the hinge margin, and the lateral angles at the front are never visible in obovata, the sides of the larger valve being in the adult specimens usually flat and vertical, which is not the case in *T. obovata*.

The figures I have given in Plate V will illustrate some of the varieties in form which are presented by this species; occasionally specimens are perfectly equilaterally triangular, others are twice as long as they are wide, while some are as wide as they are long, and were well figured and described by Mr. Smith, in 1816. It is a very common shell in the Bradford Clay Forest Marble and Great Oolite; it is found abundantly round Bath, Bradford, Cirencester, &c., it occurs by millions at Ranville, in Normandy, and in other localities, and is also stated to be found at Muggendorf, by Von Buch. Fig. 18 illustrates Mr. Smith's specimens, now in the Collection of the British Museum.

34. TEREBRATULA OBOVATA, *Sow.* Pl. V, figs. 14—17.

TEREBRATULA OBOVATA, *Sow.* Min. Con., 1812, vol. i, p. 228, tab. 101, fig. 5.
— — *Morris.* Catalogue, 1843.
— — *D'Orb.* Prodrome, vol. i, p. 316, 1849.

Diagnosis. Shell obovate, transverse, valves nearly equally convex, gibbous, beak more or less recurved and rounded, foramen entire, with lateral ridges recurved and joining the hinge margin within a short distance of the beak; deltidium in two pieces, more or less visible, according as the beak becomes more or less recurved: front straight or slightly convex, bounded by two obsolete plaits, sides rounded, margin rather flat, loop simply attached to the Crura and extending to near the front margin. Dimensions variable, length 15, width 13, depth 10 lines.

Obs. This species was correctly described by Sowerby in 1812. It is a thick globose shell, abundantly spread in the Cornbrash of many localities; as at Rushden, in Northamptonshire, where it attains large dimensions, as may be seen from a suit of specimens from that locality, presented to the British Museum by Mr. Waterhouse. It is also abundant in Wiltshire, where specimens showing the loop to great perfection can be obtained. It occurs near Scarborough, where it was obtained by Mr. Bean, and is likewise found in many parts of the Continent; at Boulogne, by Mr. Bouchard. D. Bronn does not appear to have been acquainted with this species, from what we find in the 'Index Palæontologicus.' It is always more globose than *T. digona,* and does not present any frontal angles, its greatest width is also considerably increased towards the middle of its length.

Pl. V, fig. 16, illustrates one of the original specimens of the M. C.
,, 14, 15, two full-grown specimens from the British Museum; fig. 17 showing a curious deformity in this species, in which the accident is reproduced on both valves.
Pl. VII, fig. 5, is a very curious shell found in the Cornbrash of Norman Cross, by Mr. Morris, along with the true types of *obovata* and *lagenalis;* after minute comparisons, Mr. Morris and myself came to the conclusion that it can only be a deformity of the species under consideration.

35. TEREBRATULA ORNITHOCEPHALA, *Sow.* Plate VII, figs. 6, 13, *and* 23.

TEREBRATULA ORNITHOCEPHALA, *Sow.* 1812. Min. Con., vol. i, p. 227, tab. 101, figs. 2, 3, 4.
— LAMPAS, *Sow.* 1812. Min. Con., vol. i, p. 228.
— TRIQUETRA, *Sow.* 1825. Min. Con., vol. v, p. 65, tab. 445, fig. 1.
— ORNITHOCEPHALA, *Smith.* 1816, 1817. Stratigraphical System of Organised Fossils.
— — *Desh.* 1836. Nouv. Ed. de Lamarck, vol. vii, p. 361.
— — *Phillips.* 1836. Geol. of Yorksh., vol. i, tab. 6, fig. 7.
— — *Zieten.* 1832. Die vers. Würt., tab. xxxix, fig. 2.
— — *Morris.* 1843. Catalogue of British Fossils.
— *Bronn.* 1849. Index Palæont., p. 1243.
— — *D'Orb.* 1849. Prodrome, vol. i, p. 316.
— SUBTRIQUETRA, *D'Orb.* 1849. Prodrome, vol. i, p. 216.

Diagnosis. Shell ovate rhomboidal, depressed when young, elongated and gibbous when adult; beak rounded, much recurved and truncated by an entire foramen closely approaching the umbo; deltidium in two pieces, more or less hid by the prominence of the beak, without distinct lateral ridge; imperforated valve, most convex near the umbonal part of the shell; when young sometimes slightly indented in front, most wide posteriorly; rather depressed laterally, and tapering more or less in front: surface smooth, finely punctuated: loop simply attached to the crura and extending to near the frontal margin; form variable; average size, length 16, width 11, depth 10 lines.

Obs. Several species have been established from varieties of the type under consideration, but they merge into one another by insensible passages; we might probably place among them *Ter. lagenalis*, Schl., and *triquetra* of Sow.; this last, especially, is only a younger, wider and slightly indented state, as I became convinced from an examination of the original specimens of the 'M. C.' lent me by Mr. J. De C. Sowerby, Pl. VII, figs. 10, 11 and 12, illustrating the original types of *T. triquetra.* The principal difference I perceive between *T. lagenalis* and *T. ornithocephala,* is that in the last the posterior margin of the shell is larger and more prominent, while in *T. lagenalis* the lateral sides are much straighter, and wider and more square in front. Prof. Brown in his '*Index Palæontologicus*' places *T. lagenalis* among the Synonyms of *ornithocephala;* and M. Deshayes in 1836, while describing *Ter. lagenalis,* states that it has some analogy to *ornithocephala;* but as several Palæontologists seem desirous of retaining the name of *T. lagenalis* for those more elongated, thicker and straighter varieties, I have described both under a distinct head, and in Pl. VII will be seen a number of specimens illustrating both. Figures 6, 7, 8, 9, 10, 11, 12, would represent the typical forms of *ornithocephala.* The interior of both *T. ornithocephala,* fig. 23, and *T. lagenalis* are completely similar; some varieties or rather specimens of *ornithocephala,* though gibbous at the umbone, present a slight longitudinal depression in that portion as seen in fig. 9. *Terebratula lampas* of Sow. is merely an internal cast of *Ter. ornithocephala,* and which M. D'Orbigny seems to adopt as a species, and gives it to a Liasic shell, but which I believe has nothing to do with Sowerby's type.

In England *Ter. ornithocephala* is found in the Kelloway Rock, at Kelloway, where it was found by Messrs. Walton, Morris, &c.: it is abundant in the Fullers-earth all round Bath; in the Cornbrash of Rushden, in Northamptonshire, where it was picked up by the Rev. A. W. Griesbach, &c.; and may be seen in the Collection of the British Museum, as well as in most collections. It is also found in many parts of the Continent. Count A. De Zigno mentions it from the Venetian Alps; Zeiten and Quenstedt in Germany; and Deslongchamps from Normandy. Pl. VII, figs. 7, 8, in British Museum; figs. 10, 11, the original specimens of *T. triquetra,* in the Collection of Mr. J. De C. Sowerby; fig. 23, interior, from the Collection of Mr. Morris.

36. TEREBRATULA LAGENALIS, *Schlotheim*. Plate VII, figs. 1—4.

TEREBRATULITES LAGENALIS, *Schl.* 1820. Petrefacta.
TEREBRATULA — *Desh.* 1836. Nouv. Ed. de Lamarck, vol. vii.
— — *De Buch.* 1834. Mém. Soc. Géol. de Fr., vol. iii, p. 194, pl. 18, fig. 7.
— — *Tennant.* 1847. A Stratigraphical List of British Fossils, p. 73.
— — *Bronn.* 1849. Index Palæont., p. 1240.

Diagnosis. Shell elongated, ovate, nearly straight in front; valves very convex and gibbous; beak rounded and much recurved, truncated by an entire foramen, almost touching the umbo; deltidium rarely visible, on account of the projection of the beak, lateral ridges indistinct; imperforated valve, gibbous and deepest near the umbo: posterior margin rounded and extending by a gentle curve to the edge of the front, which is generally straight; surface of valves smooth, finely punctuated. Loop simply attached to crura, and extending to near the margin of the shell; central septum well defined; dimensions variable. Length 22, breadth 12, depth 11 lines.

Obs. As stated under the head of *T. ornithocephala,* this species has very little to distinguish it from the above-named shell, into which it seems to merge by insensible passages; it is therefore very variable, sometimes so much thickened in front, as to form an almost flat surface, perpendicular to the surface of valve, as in fig. 1. At other times it is on the contrary acute, as in fig. 2, and tapering almost into a sharp edge (fig. 4); the beak is also more recurved than in *T. ornithocephala* (fig. 1), but in some specimens, as in fig. 2, the deltidium is completely exposed.

This species is abundant and finely preserved in the Cornbrash of Rushden, Norman Cross, Undle, and Thorpe, in Northamptonshire, where it has been collected by the Rev. A. W. Griesbach, Messrs. Waterhouse, Morris, and others. It has also been met with by Messrs. Lowe and Walton, in the Fullers-earth near Bath, and from near Stamford, in Lincolnshire. On the Continent it is abundantly distributed, and fine specimens, two inches in length, have been obtained by M. Bouchard, from the Cornbrash of the neighbourhood of Marquise (Pas de Calais). In Germany we meet it at Wöschnau, at Grumbach near Amberg, and near Scheffhausen, Wurtemberg.

37. TEREBRATULA SUBLAGINALIS, *Dav.* Plate VII, fig. 14.

Diagnosis. Shell inequivalved, oblong, valves convex, margin line nearly straight, front indented and nearly as wide as the greatest width of shell; smaller valve convex in its posterior portion, two rounded ridges rise soon after leaving the umbo and diverging till they reach the lateral edges of the front, leaving a depressed concave portion or sinus between them, extending and increasing in concavity as it approaches the front. Beak rounded, without distinct lateral ridges, and truncated by an entire foramen of moderate size; deltidium in two pieces, surface smooth and punctuated; margin line nearly straight all round. Loop simple, attached only to crura and extending to near the frontal margin. Length 15, width 8, depth 9 lines.

Obs. This species is found in the Cornbrash of Northamptonshire, is always accompanied by *T. lagenalis,* of which it may perhaps only be a variety; its great width in front and deep longitudinal sinus, as well as the rounded ridges, which in both valves proceed from the frontal edges to the centre of the umbo, seems to M. Bouchard sufficient reasons for separating it from *Lagenalis.* It is not, however, difficult to find specimens uniting *ornithocephala* to *lagenalis,* and this last to *sublagenalis,* but as the typical shapes of each are well distinguishable, it will be found convenient to retain them under distinct specific names.

This last-described species is found in the Cornbrash of Northamptonshire, and of Boulogne-sur-mer.

38. Terebratula Cardium, *Lamarck.* Plate XII, figs. 13—18.

Terebratula cardium, *Lam.* 1819. Anim. sans Vert., vol. vi, No. 47. Figured in Ency. Méthod., pl. 141, fig. 6.
— orbicularis, *Sow.* 1829. Min. Con., vol. vi, p. 68, tab. 535, fig. 3.
— furcata, *Sow.* 1829. Min. Con., vol. vi, p. 67, tab. 535, fig. 2.
— orbicularis, *Morris.* 1843. Catalogue.
— — *V. Buch.* 1838. Mém. Soc. Géol. de France, vol. iii, 1^{ere} Série, p. 160, pl. 16, fig. 3.
— cardium, *Deslongchamps.* 1837. Soc. Linn. de Normandie.
— orbicularis, *Bronn.* 1849. Index Palæont., p. 1243.
— — *D'Orb.* 1849. Prodrome, p. 315.
— cardium, *Dav.* 1850. Notes on an Examination of Lamarck's Fossil Terebratula. Annals and Mag. of Nat. Hist., June 1850.

Diagnosis. "*T. Testâ elongato-ovatâ, convexâ, plicatâ, sulcis longitudinalibus crassis rotundatis: nati prominula.*"—(Lamarck.)

Shell inequivalved, more or less oval, elongated, uniformly convex; beak in larger valve straight, truncated by a large entire foramen, separated from the umbo by a narrow concave deltidium in two pieces; lateral ridges, indistinct valves regularly plaited, variable in size, acute, bifurcated when young, and sometimes, though rarely, when adult; surface punctuated, loop long, attached simply to crura, and extending to near the frontal margin. Length 16, width 12, depth 11 lines.

Obs. This species was first figured by Bruyere, in the Ency. Méth., and described, in 1819, by Lamarck, under the name of *Ter. cardium,* which name must be preserved. In 1829 it was figured and described by Sowerby, under the name of *T. orbicularis,* and the young under that of *T. furcata;* and it is singular to see that most authors (among whom M. D'Orbigny) have made use of Sowerby's name in preference to Lamarck's, published long before, and figured in the Ency. Méth., to which figure Lamarck refers. The size and number of plaits in this species are very variable; they are often few in number, wide and strong; at other times numerous and more delicate, commencing at the umbo and beak, becoming gradually and regularly wider as they approach the front; generally, in the young state, the plaits are divided towards the margin, and while placing these into another species, (*T. furcata,*) Mr. Sowerby states, "it is therefore possible these may be only young of *orbicularis.*" In adult specimens it is rare to see the plaits bifurcated, but as a proof that it is sometimes so, we have figured Plate XII, fig. 15, a remarkable specimen, found by M. Deslongchamps, wherein the plaits are once and even twice divided; we are also indebted to M. Deslongchamps for the fine specimen illustrating the loop. Professor King, in his 'Monograph of Permian Fossils,' proposed to separate this species from the genus Terebratula, under the generic title of *Eudesia,* but in the Appendix seems disposed to cancel the genus, as it possesses all the characters of true Terebratula. *Ter. cardium* does not vary to the extent of most species, and is always recognisable; it is found abundantly in the Great Oolite of Bath, Cirencester, &c., and in beds of similar age at Boulogne-sur-mer, Caen, &c.; it was never found in the Lias of Weston, as stated by Mr. Sowerby, and subsequently by other authors, but it seems confined to a narrow vertical range, and to be characteristic of the Great Oolite.

39. TEREBRATULA BUCKMANII, *Dav.* Plate VII, figs. 15, 16.

Diagnosis. Shell irregular, oval, longer than wide; valves convex, smooth, minutely punctuated; beak small, truncated by a large entire foramen, almost touching the umbo; deltidium small, concealed; lateral ridges indistinct; margin line curved, rising in front. Length 18, breadth 11, depth 8 lines.

Obs. This species occurs in the Inferior Oolite of Winchcombe, near Cheltenham, where it was found by Professor Buckman, Dr. Wright, and others. It is quite distinct from *T. ornithocephala* by its shape, form of beak, foramen, and hinge marginal line of valves. We likewise find in the smaller valve of some specimens a central longitudinal elevation, extending from the umbo to the front, from which the two remaining lateral portions of the valve recede rather abruptly, as may be seen in fig. 16. Pl. VII, figs. 15, 16, from Prof. Buckman's Collection.

40. TEREBRATULA LYCETTII, *Dav.* Plate VII, figs. 17—22.

Diagnosis. Shell more or less circular; small, valves convex; beak rounded, truncated by an almost emarginate foramen; the deltidium in two pieces, touching only in one point above the umbo; lateral ridges indistinct; marginal line slightly curved; surface smooth, finely punctuated. Length 8, width 7, depth 4 lines.

Obs. This small species was found by Mr. Moore in the upper Lias of Barrington, near Ilminster, where it abounds, and varies in size from 1 to 8 lines in length, but does not appear to attain longer dimensions.

41. Terebratula punctata, *Sow.* Plate VI, figs. 1—6.

Terebratula punctata, *Sow.* Min. Con., 1812, vol. i, p. 46, tab. 15, fig. 4.
— — *Morris.* Catalogue, 1843.

Diagnosis. Shell inequivalved, depressed, convex; beak small, not much recurved, truncated by an entire foramen of moderate size; deltidium in two pieces; beak ridge soon lost; margin line curved and slightly raised in front; surface smooth and minutely punctuated; loop short, attached only to crura, and extending to little more than a third of the length of the valve. Length 16, width 12, depth 7 lines.

Obs. No species has perhaps given more trouble to make out than the one under consideration, being difficult to characterise from its variations in form, particularly if we examine a number of specimens. It seems nearly connected to the following form, which we have separated, as it presents certain differences sufficiently constant to render it desirable to preserve both under distinct names, and I do so the more readily, as it is also the opinion of M. Bouchard, Mr. Moore, and others, who likewise examined the subject with some attention; nor am I astonished that foreign Palæontologists have been unable to recognise this species. Lamarck quotes it in 1819, but on the inspection of shells he had placed under that name, I found none belonging to the species. Von Buch considered it a synonym of *ornithocephala;* Professor Brown places it under both *ornithocephala* and *carnea* (vide Index); and M. D'Orbigny, more cautiously, leaves it out entirely in his 'Prodrome;' still it is quite distinct from either of the shells to which it has been considered a synonym, which is perfectly proved by the size, length, and form of its loop, differing completely from that of *Ter. carnea,* where it extends only to a few lines from the crura, while in *T. ornithocephala* it nearly reaches the frontal margin. In *T. punctata,* as may be seen (Plate VI, fig. 3,) from the specimen drawn from Mr. Sowerby's original type, this process extends to nearly half the length of the shell, and is intermediate between that of *T. carnea* and *T. ornithocephala,* the beak and foramen being also quite different in those shells. *Ter. punctata* is moreover a Liasic species, and, from its date, holds specific claims of priority, whatever shells may be grouped into its type or removed from it.

The name of *T. punctata* was unappropriate, since all true Terebratulas are more or less strongly punctuated; it is, however, interesting to remark that this character was observed so far back as 1812 by Mr. Sowerby. It belongs to the middle Lias, and is stated by that author to have been found in the dark limestone of Aylesford, at a place called Horton; it was also collected in the Lias of Deddington, by Mr. C. Faulkner; and at Dumbleton, near Cheltenham, by Professor Buckman; it occurs at Farington, Gurney, and many other places. Plate VI, figs. 1, 2, and 3, illustrate the original specimens, kindly lent me by Mr. J. de C. Sowerby, which were figured in the 'Min. Con.'

42. Terebratula subpunctata, *Dav.* Plate VI, figs. 7—10, 12, 16?

Diagnosis. Shell inequivalved, ovular; valves almost equally convex; beak rounded, recurved, and truncated by a rather large entire foramen of an elongated shape, projecting over the umbo, so as to conceal the triangular deltidium, in two pieces, existing under it, and therefore rarely visible. The ridges of beak soon become indistinct; marginal line slightly curved and raised in front; surface smooth, punctuated; loop attached only to crura, and extending to about a little more than one third of the length of shell; the lamella is strong and wide. Length 28, width 20, depth 17 lines. These are the dimensions of the largest specimen known, but the average size is much less.

Obs. The different figures I have given in Plate VI will show, to a certain degree, the extent of variability observed in this shell, which is much deeper, stronger, and more convex than in true *T. punctata;* it is, however, allied to that species, and many specimens pass from one type into the other. The beak is less recurved, and deltidium more apparent, in *T. punctata*, its front being also more rounded. In many specimens of this species we observe a well-defined flatness at the umbo; it cannot be considered a character, but rather a deformity, caused by pressure in the young state, retarding the normal and regular development of the shell, which is also shown by strong lines of growth. Fig. 8, and still more fig. 12, illustrate how much such a malformation changes the general aspect of the shell. *Ter. subpunctata*, which I have so named from its close affinity to *punctata*, is abundantly distributed in the marlstone or middle Lias of South Petherton, near Ilminster, and in other localities. On the Continent it was found by M. Deslongchamps and myself, in the Liasic beds of Evrecy, &c. Along with the specimens found at South Petherton, by Mr. Moore, was one (fig. 16) which I have been unable to place anywhere, except under the head of a deformity of the shell under consideration, the form of its beak and foramen being the same, and it has many visible marks of pressure upon it. Figs. 8, 10, 12, are from the Collection of Mr. Moore.

43. Terebratula indentata, *Sow.* Plate V, figs. 25, 26.

Terebratula indentata, *Sow.* Min. Con., 1825, vol. v, p. 65, tab. 445.
— — *Morris.* Catalogue, 1843.
— — *Bronn.* Index Palæont., 1849.

Diagnosis. Shell elleptical, longer than broad; valves nearly equally convex; beak recurved, and truncated by an entire foramen; lateral ridges lost at a short distance from the foramen, sometimes notched in front; surface smooth, punctuated; loop short, simply attached to the crura. Dimensions variable; size of largest specimen, as yet observed,—length 14, width 10, depth 9 lines.

Obs. As Sowerby remarks, when describing this species, it sometimes shows little or no marks of that indentation from which the name is derived; it is one of those species which present some difficulties, not being as well characterised as we might wish, and leading us, by gradual links, into *Ter. punctata*, with which it is generally associated. It occurs in the middle Lias of Banbury, as stated by Mr. Sowerby; it was found also at Deddington by Mr. C. Faulkner, where it is associated with *Ter. resupinata.* It is common at Farington, Gurney, &c. M. D'Orbigny erroneously considers this species as a synonym of *Ter. digona,* (*vide* 'Prodrome,' p. 315,) from which it is perfectly distinct, and belongs to the Lias, and not to the Bath Oolite, as stated by that author. Its loop is short, extending only to less than half the length of the shell, while in *Digona* it nearly reaches the frontal margin of the shell. This species is also found on the Continent, but does not appear to be known to the Palæontologists there. Figs. 25, 26, from the Collection of Mr. Walton.

44. TEREBRATULA INSIGNIS, *Schübler.* Plate XIII, fig. 1.

TEREBRATULA INSIGNIS, *Schübler.* Zieten, 1832. Die Verst. Würtembergs, pl. xl, fig. 1.
— — *D'Orb.* 1849. Prodrome, vol. i, p. 376.
— — *Quenstedt.* 1843. Dos Flözgebirge Würtembergs, p. 484.

Diagnosis. Shell inequivalved, more or less oval, longer than wide; valves convex, deepest towards the posterior portion; beak produced, slightly recurved, and obliquely truncated by a moderately-sized foramen, separated from the umbo by a rather long deltidium *in one piece;* lateral ridges indistinct; in smaller valve a well-defined mesial fold is seen to extend to the front, with lateral depressions; larger valve regularly convex, no deep sinus corresponding to the elevation in its smaller valve; surface smooth, punctuated; loop short, simply attached to crura, and extending to less than half the length of valve. Length of our British specimen 20, breadth 15, depth 11 lines.

Obs. This remarkable Oolitic species has not before this been noticed in England; it occurs in the Oxford Clay of St. Ives, and in the Coralline Oolite of Malton. It seems little known even to Continental Palæontologists. *Von Buch*[1] erroneously considers it a synonym of *T. perovalis,* and Dr. Bronn[2] the same as *Ter. biplicata,* likewise a mistake: it is perfectly distinct from both by its general appearance, and especially by its deltidium formed of one piece instead of two, which is the case with both *T. perovalis* and *biplicata.* This species was well figured by Zieten in 1832, and correctly noticed by M. D'Orbigny in his 'Prodrome;' he places it both in the Oxford Clay and Coralline Oolite.

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[1] Mém. Soc. Géol. de France, vol. iii, 1^{ere} Série, 1838.

[2] Index Palæontologicus, vol. ii, p. 1239. Dr. Bronn's synonyms of *Ter. biplicata* are far from being correct, and it is evident that Sowerby's species is little known.

It is not improbable, that the specimens attributed by Roëmer[1] and Pusch[2] to *T. perovalis* belongs to *T. insignis.*

Though small in England, in some continental localities it attains very large dimensions. I have specimens from the Coral Rag of Nattheim Wurtemberg, sent me by H. Krantz, measuring 3 inches in length and 2 in breadth; it is found in many other localities, such as in the Oxford Clay of Boulogne-sur-mer, where it was found by M. Bouchard; at Ecommoy (Sarthe), route de Gray, near Besançon; La Latte, Apremont (Ain), in the Coralline Oolite of Chatel-Censori, Tonnerre (Yonne), &c., and in many German localities. The specimen figured in my plate is from the collection of Mr. Bean, of Scarborough, who found it at Malton.

45. TEREBRATULA SIMPLEX, *Buckman.* Plate VIII, figs. 1, 3.

TEREBRATULA SIMPLEX, *Buckman.* 1845. Geol. of Cheltenham, pl. vii, fig. 5.
— — *Tennant.* 1847. A Stratigraphical List of British Fossils, p. 74.

Diagnosis. Shell inequivalved, longer than broad; larger valve convex; beak rounded, recurved, and truncated by an entire foramen, thickly edged and concentrically furrowed, advancing over the umbo, which is partly concealed, as well as the deltidium, which forms a concave inward curve, transversally striated by minute lines; no distinct lateral ridge; imperforated valve, moderately convex, flat, or slightly concave, especially towards the front; surface smooth, finely punctuated. Length 2 inches 4 lines, breadth 2 inches 1 line, depth 1 inch 5 lines.

Obs. This species, when young, seems to have its smaller valve flat, depressed, nearly even; this is also seen in some old shells, (Plate VIII, fig. 2,) the junction of both valves forming in front an acute angle, but in general, in adult specimens, such as Plate VIII, fig. 1, the upper valve is convex, though never very gibbous, much thickened, and emarginate. This species is well characterised, but placed erroneously by M. D'Orbigny as a synonym of *Ter. lata* (Sowerby), with which it differs in shape, form of beak, deltidium, &c. *Ter. simplex* is found in the pea-grit bed of the Inferior Oolite of Crickley and Leckhampton Hills, near Cheltenham and Minchinhampton, and fine specimens are preserved in the British Museum, and in the Collections of Dr. Wright, Messrs. Lycett, Morris, &c.; the largest specimens obtained as yet, fig. 1, is from the collection of the Geological Society; figs. 2 and 3 were kindly lent me by Messrs. Buckman and Walton.

46. TEREBRATULA OVOIDES, *Sow.* Plate VIII, figs. 4—9.

TEREBRATULA OVOIDES, *Sow.* 1812. Min. Con., vol. i, p. 227, tab. 100.
— LATA, *Sow.* 1812. Min. Con., vol. i, p. 227, tab. 100.

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[1] *Roëmer.* 'Dei Versteinerungen des Norddeutschen Oolithen-Gebirges, tafel ii, fig. 3.

[2] *Pusch.* 'Polens Palæontologie,' tafel iv, fig. 8, and perhaps fig. 5.

Terebratula trilineata, *Young* and *Bird.* 1828. Geol. of York., pl. viii, fig. 17.
— ovoides, *Young* and *Bird.* 1828. Geology of Yorkshire, pl. viii, fig. 12.
— — *Desh.* 1836. Nouv. ed. de Lamarck, vol. vii, p. 361.
— — *Morris.* 1843. Catalogue, p. 135.
— lata, *Morris.* 1843. Catalogue, p. 134.
— trilineata, *Morris.* 1843. Catalogue, p. 137.
— ovoides, *Bronn.* 1849. Index Palæont., p. 1244.
— trilineata, *Bronn.* 1849. Index Palæont., p. 1254.

Diagnosis. Shell ovate, elongated, valves moderately convex, beak prominent, subcarinated and truncated by a rather large entire foramen, without distinct lateral ridges, deltidium well defined, in two pieces; lateral margin of valves straight with rounded front; surface smooth, punctuated, and marked by concentric lines of growth. Length 2 inches 2 lines; breadth 1 inch 10 lines; depth 11 lines.

Obs. This species seems little known and has given rise to much confusion, but having obtained the loan of a great many specimens, referred to it from Messrs. Sowerby, Bowerbank, Ripley, C. B. Rose, Bean, Morris, &c., and from different localities, I was soon convinced that Sowerby's *Ter. ovoides* was the same as his *Ter. lata,* which can be perceived by the simple examination of Pl. 100, of the 'Min. Con.,' which is only a wider and more depressed specimen of the same species, nor does Sowerby's figures give a very correct illustration; it is also evident from a numerous suit of Young and Bird's *Ter. trilineata* kindly sent me by Mr. Ripley, of Whitby; this species must be also placed among the synonyms of *T. ovoides.* These authors appear to have been only acquainted with internal casts of these shells, since they state that the smaller valve is always marked by three slender depressed lines diverging from the umbo, owing to which circumstance they gave it the name of *trilineata;* these said lines are due to the central septum and muscular impressions, visible on the surface of internal casts of most species of Terebratula, and therefore cannot be used as a character; they also allude to the difference observable in width and length, as well as thickness, in this species; it is the case too in *Ter. ovoides* and *lata* of Sowerby, the pinched beak visible in many specimens, and especially in internal casts, appears to be one of its characters.

In Pl. VIII, fig. 5, we have represented Sowerby's *Ter. ovoides;* fig. 4, his *Ter. lata;* and figs. 6--9, Young and Bird's *Ter. trilineata,* which, as I stated, belong all to one type; and as *Ter. ovoides,* Sow. appears the most common form, I have selected it to represent the species, which is variable in its shape and dimensions; it is a flattish shell, rarely very convex or gibbose. M. Deshayes, in 1836, adopted the name of *T. ovoides,* and places *lata* among its synonyms. Its Geological range has not yet been quite satisfactorily established; probably it lived during different deposits of the Oolitic series. From the Inferior Oolite of Robin Hood's Bay, near Whitby upwards, Sowerby states his *Ter. lata* and *Ovoides* occur in blocks, and sandstone containing green-sand, in alluvial deposits of gravel, fragments of chalk, &c., in some parts of Suffolk. It is not, however, a Cretaceous, but an Oolitic shell, as Mr. C. B. Rose admits, and in which opinion I entirely concur.

It is evident that Professor Bronn is in error, when placing *Ter. perovalis*, Sowerby, as a synonym of *Ter. lata* (see 'Index Palæontologicus'). Nor can I agree with M. D'Orbigny in thinking *Ter. simplex* to be a synonym of *T. lata* (Prodrome, p. 287).

47. TEREBRATULA MAXILLATA, *Sow.* Plate IX, figs. 1—9.

TEREBRATULA MAXILLATA, *Sow.* 1825. Min. Con., p. 52, pl. 436, fig. 4.
— — *Morris.* Catalogue, 1843, p. 134.
— — *Morris* and *Dav.*, 1847. Annals and Mag. of Nat. Hist., pl. xix, fig. 5.
— — *D'Orb.* 1849. Prodrome, vol. i, p. 287.

Diagnosis. Shell subquadrangular, as broad as long, valves nearly equally convex, beak produced, narrow, and strongly recurved; foramen large, oblique; deltidium obtusely triangular; cardinal area slightly depressed, with obtuse lateral ridges; imperforated valve with a mesial sinus, and two lateral ones corresponding to the lobes of the perforated one, and which only extends one third inwards from the margin; front strongly sinuated in the young state, while for a considerable period of growth, no trace of sinuated margin is perceptible. Loop attached only to crura, extending to little more than one third of the length of valves. Length 32, breadth 34, depth 18 lines.

Obs. This is a very variable shell both in form and size, it is well described by Sowerby in 'M. C.,' who states it to be "distinguished from *Ter. intermedia* by the depth of the sinuses and consequent furrows which extended at least half way to the beak, in some specimens the two ridges between the furrows are very prominent and approach more nearly together, than in the specimens figured; such shells are generally long shaped, &c." This species has been found to attain in some localities much larger dimensions than those observed by Sowerby, who states it to be "always smaller than *Ter. intermedia.*" In the 'Annals and Mag. of Nat. Hist.,' October 1847, Mr. Morris and myself had occasion to notice some large specimens of this species found at Pickwick, which are figured in Plate XIX of that periodical. Since that period, still larger specimens have been procured, as may be seen in the Collection of the British Museum (Plate IX, fig. 4); and we have been able to trace every size in this species, from that of a pin's head to the larger specimens just mentioned; its greatest diameter is sometimes in the longitudinal, at other times in the transverse direction; some varieties are with the same dimensions deeply plicated, while others show no traces; in the young state, and for a considerable period of growth, there is no indication of plication, as may be seen by a glance at Plate IX, where we have illustrated all these different states; fig. 1 is the original form, considered by Sowerby as the type of the species. *Ter. maxillata* is abundantly distributed throughout the Forest Marble, the Bradford Clay, and the great Oolite round Bath, near Sapperton, and Hailey Wood, about Cirencester, &c.; large specimens were found on the Continent, at Boulonge-sur-mer, by M. Bouchard. Professor Bronn, in his 'Index Palæontologicus,' considers, erroneously, this species a synonym of *Ter. biplicata*, thus placing together, under one head, a number of different species. Pl. IX, fig. 3, from the Collection of Mr. Morris; fig. 4, in British Museum; fig. 9, from the Collection of Mr. Bowerbank.

Var. SUBMAXILLATA, *Morris*. Plate IX, figs. 10—12.

The shell which I here place as a variety of *Ter. maxillata* would appear to some Palæontologists specifically different, but after a long and minute examination of a considerable number of specimens, I came to the conclusion that the distinctive characters were not sufficiently well defined or important to require it to be thus widely separated. This variety is found in a light-yellow clay bed of the middle division of the Inferior Oolite along with *Ter. plicata*, *fimbria*, and other well-characterised species. Var. *submaxillata* is more pentagonal in form than what we observe commonly in *maxillata*, the posterior portion of the shell is straighter, tapering, and less circular than is generally seen in Sowerby's type; the young state, in both species and variety, is exactly similar.

Many fine specimens of this variety are preserved in the Collections of Dr. Wright, Professor Buckmann, Messrs. Lycett, Morris, and others, who kindly forwarded to me these specimens. Figs. 10 and 12, from the Collection of Prof. Buckman; fig. 11, from that of Dr. Wright.

48. TEREBRATULA PEROVALIS, *Sow.* Plate X, figs. 1, 6.

TEREBRATULA PEROVALIS, *Sow.* Min. Con., 1825, vol. v, p. 51, t. 436, figs. 2, 3.
— — *Deslongchamps.* 1837. Soc. Linn. de Normandie.
— — *V. Buch.* 1838. Mém. Soc. Géol. de France, vol. iii, 1ere Série, p. 221, pl. xx, fig. 2.
— — *Morris.* Catalogue, 1843, p. 135.
— — *Bronn.* 1849. Index Palæont., p. 1245.
— — *D'Orb.* 1849. Prodrome.

Diagnosis. Shell inequivalved, ovate, longer than wide, greatest width towards the middle. Cardinal and lateral marginal line forming a gentle and regular uninterrupted curve, with or without two more or less defined rounded ridges in frontal portion, hardly perceptible in the adult state, where the sinus separating the two ridges is filled up by the convexity of the valve extending to the frontal margin, and presenting one large elevation, with two lateral sinuses more or less indented. Rostral valve convex, with depressions corresponding to the elevations in the smaller valve; beak rounded and truncated by a large entire foramen, nearly touching and projecting over the umbo, generally concealing the deltidium; lateral ridges indistinct, surface smooth and punctuated; loop simply attached to crura, and short, extending to only about two fifths of the length of the valve. Length 33, breadth 28, depth 23 lines; the average dimensions are much less.

Obs. The original specimens described by Sowerby in the 'Min. Con.,' and of which I have given correct figures, Plate X, figs. 1, 2, would hardly convey an idea of the species under consideration, which varies considerably, as may be seen from the several illustrations offered in Plate X. Under favorable circumstances this species attained considerable dimensions, and is the largest Oolitic brachiopoda with which we are acquainted. These larger forms have been by some believed separable from *T. perovalis,* and long known under the name of *T. ovoidea,* but as we can trace every stage of growth and variation, from Sowerby's type to the large specimens in the same beds and localities, it is evident they must all belong to the same species, variable from the presence or nonpresence of the two frontal ridges described above. The same has been observed relative to *T. maxillata,* where, under favorable circumstances, that as well as other species have attained dimensions far exceeding those of the original type. We are indebted to that excellent observer, M. Deslongchamps, for the knowledge of the internal loop of this, as well as of other forms, worked out with the greatest skill and patience, we perceive that in this as in most species where the loop is short, the lamella becomes much wider and stronger than in those where the process extends to near the frontal ridge. *T. perovalis* is a common and characteristic fossil of the Inferior Oolite, both in England and on the Continent. The largest and finest specimens have been obtained from Dundry, Dinnington, Yeovil, &c., the best species being preserved in the Collections of the Bristol Institution, British Museum, &c. *Ter. perovalis* is also very abundant in Normandy, where specimens three inches in length have been procured, as may be seen in the Ecole des Mines of Paris, and in the Collection of M. Tesson, of Caen, &c., and, although a well characterised species, it has often been mistaken by many Geologists and Palæontologists, who refer to it forms perfectly distinct, as may be seen by the synonyms given of it. Thus Von Buch thinks *Ter. insignis* (Schübl) to be a variation of this species, but from which it completely differs, its deltidium being formed of one piece, while in *T. perovalis* it is divided in two, besides many other distinctions, which we shall notice under that species. Fig. 1, 2, from the Collection of Mr. J. de C. Sowerby; fig. 4, from that of Mr. Moore.

49. TEREBRATULA INTERMEDIA, *Sow.* Plate XI, figs. 1—5.

TEREBRATULA INTERMEDIA, *Sow.* 1812. Min. Con., vol. i, p. 48, tab. xv, fig. 8.

Diagnosis. Shell inequivalved, obtusely five-sided, longer than wide; beak rounded, recurved, and obliquely truncated by a rather large foramen, slightly overlaying the umbo, and concealing the deltidium in two pieces; lateral ridges indistinct; imperforated valve less convex than the other, with (sometimes without) two rounded costæ, commencing about the middle, and continued to the margin, with a mesial furrow or sinus, and two lateral ones; front margin moderately sinuated; surface smooth, punctuated; loop short and simply attached to crura, extending to less than half the length of the shell. Length 23, width 18, depth 13 lines.

Obs. Sowerby's figures in the 'Min. Con.' do not illustrate this species in a satisfactory manner, which has been the cause of many mistakes, as it is evident most authors have not understood the shells intended as types, of which I became convinced from inspecting the original specimens. Its exact stratigraphical age is the *Cornbrash*, as distinctly stated by Sowerby, still we find it placed by Von Buch,[1] Dr. Mantell,[2] and others, in the chalk; some state it to be from the *Lias, Great Oolite, Oxford clay*, &c., but it is singular few place it in its true stratigraphical position,[3] nor do I believe Zieten's figures referable to this species. *Ter. intermedia* bears some resemblance to *Ter. perovalis*, some specimens are indistinguishable; the common type differing, however, from the Inferior Oolite specimens, in being wider and more regularly circular, especially towards the beak and hinge margin: when young it is almost circular, without biplication, which only appears at a more advanced age, and it may be remarked that it is impossible to determine to what species some young shells belong, from the great resemblance they bear to each other, specific distinctions only appearing at a more advanced period of growth. The name of *intermedia* is well chosen, as its characters are intermediate, and lead us to such shapes as *Ter. Phillipsii* and *globata;* from the first it is distinguished by its more circular form, and from the last in being more depressed, and is a much larger shell. Lamarck's *Ter. intermedia* appears to be a Rhynchonella, otherwise his species could not hold priority over Sowerby's, published in 1802.[4]

Ter. intermedia is abundantly found in the Cornbrash of Stanton, in different parts of Wiltshire, Rushden, &c., associated with *Ter. lagenalis, obovata, Bentleyi*, &c. Many fine specimens are to be seen in the collection of the British Museum, and in the cabinets of many collectors; it was found also by M. Bouchard in the neighbourhood of Boulogne-sur-mer. Pl. XI, fig. 1, 3, in the Collection of Mr. Morris; fig. 2, in that of Dr. Wright; fig. 5, in the British Museum.

50. TEREBRATULA PHILLIPSII, *Morris*. Plate XI, figs. 6—8.

TEREBRATULA PHILLIPSII, *Morris*. 1847. Annals and Mag. of Nat. Hist., p. 255, pl. xviii, fig. 9.
— — *D'Orb*. 1849. Prodrome, vol. i, p. 287.

Diagnosis. Shell elongated, irregularly pentagonal, posterior half of the shell and beak tapering, truncated by an entire moderately large and rather oblique foramen, separated from the umbo by a deltidium wider than high; lateral ridges obtuse and indistinct; large valve more convex than smaller one, with a somewhat incurved and produced beak; smaller valve with two rounded costæ, commencing about the middle and continued to the margin, with a broad deep mesial furrow or sinus, and two lateral ones; front deeply sinuous, surface punctuated. Length 28, breadth 20, depth 13 lines.

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[1] *Von Buch.* 'Mém. Soc. Géol. de France,' vol. iii, 1ere Serie, 1838, where it is placed as a synonyme of *Carnea.*

[2] *Dr. Mantell.* 'Fossils of South Downs.'

[3] See D'Orbigny's 'Prodrome;' Morris's Catalogue, p. 133.

[4] See Davidson's Notes on an Examination of Lamarck's Species of Fossil Terebratulæ, 'Annals and Mag. of Nat. Hist.,' June 1850.

Obs. This species, as stated by Mr. Morris in the 'Annals and Mag. Nat. Hist.,' has some resemblance to *Ter. perovalis,* Sowerby, but is easily recognised by its more elongated, pentagonal, and depressed form, the greater width of the sinus and lobes, the more sinuated front, and the greater prominence of the dorsal ridge; it is also separated from *T. sella,* Sow. by its elongated form, the greatest width being nearer the frontal margin than in that species where it is central.

Ter. Phillipsii is from the Inferior Oolite of Dinnington, near Ilminster, Burton, near Bridport, near Cheltenham, &c. On the Continent it is found in Normandy, in beds of a similar age. Messrs. Moore, Walton, Bunbury, Wright, Deslongchamps, and others, possess fine specimens, and it is also to be seen in the collections of the British Museum and Geological Survey.

51. Terebratula globata, *Sowerby.* Plate XIII, figs. 2—7.

Terebratula globata, *Sow.* 1825. Min. Con., p. 51, pl. 436, fig. 1.
— Kleinii, *Morris, Desh., D'Orb., Bronn* (non *T. Kleinii,* Lamarck).

Diagnosis. Shell subglobose, longer than wide; beak rounded, recurved, and obliquely truncated by a circular foramen of moderate size, almost touching the umbo, and concealing the deltidium, which is small; lateral ridges indistinct; smaller valve very convex at umbo, with two rounded costæ, commencing near and extending to the front, where they are slightly produced, with mesial sinus and two lateral ones, corresponding to the elevations in larger valve; margin of valves much sinuated; surface smooth, finely punctuated; loop attached only to crura, and extending to less than half the length of the shell. Width 11, length 13, depth 10 lines.

Obs. Most authors have attributed Sowerby's *T. globata* to *Ter. Kleinii* of Lamarck; M. Deshayes, Morris, D'Orbigny, Bronn, &c. have fallen into the common error, but the kind loan I received of the original collections of Lamarck and Sowerby has enabled me to prove that both species were completely distinct.[1] *Ter. globata* is one of those shells the continual variations of which render it most difficult to describe. In Plate XIII, I have endeavoured to illustrate a few of its varieties; figs. 2 and 3 are drawn from Sowerby's types, and fig. 4, from the Inferior Oolite of Dundry, may likewise be considered a good representation of the species. In the Inferior Oolite of Leckhampton and Cotswold Hills, we find a larger variety, which cannot be separated from *T. globata,* figs. 5, 6, 7; it is sometimes almost circular, and at other times so much elongated as to appear to belong to another form, we however find every passage connecting these extremes; another variety, also, seems to occur in the Fullers Earth, round Bath, offering every possible variation of form and convexity which we believe inseparable from the original type. Mr. Waterhouse and myself took much trouble in minutely comparing a vast number of specimens, forwarded to me from different quarters, with the types of Mr. Sowerby's collection; we also compared it with the origiual *Ter. sphæroidalis* and *T. bullata*, which some authors (Bronn, '*Index*,') have considered synonyms of *globata*, while others (D'Orbigny, '*Prodrome*,') separate *T. sphæroidalis*, and place *bullata* as a synonym of *globata*; lastly, M. Deslongchamps places *T. bullata* and *sphæroidalis* as synonyms, and separates *globata*. We are disposed to adopt this view, and to consider *T. bullata* as a variation of *sphæroidalis*. It possesses more of the characters of this last than of *globata;* its margin is scarcely sinuated, and wants those defined costæ and well-marked sinuses characteristic of the species under consideration. It may be said that *bullata* is a connecting link between *globata* and *sphæroidalis*, but more nearly allied and more properly placed as a variation of the last-named type.

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[1] See Davidson's Notes of an Examination of Lamarck's Species of Fossil Terebratula, 'Annals and Mag. of Nat. Hist.,' June 1850.

Ter. globata is abundantly found in the Inferior Oolite of Dundry, Cheltenham, Nunney, near Frome, &c., and fine specimens are preserved in the British Museum, that of the Geological Survey, Bristol Museum, and collections of Messrs. Walton, Buckman, Sowerby, and Dr. Wright. Pl. XIII, fig. 2, 3, from the Collection of Mr. J. de C. Sowerby; fig. 5, from that of Mr. Walton.

52. TEREBRATULA BUCCULENTA, *Sowerby*. Plate XIII, fig. 8.

TEREBRATULA BUCCULENTA, *Sow.* 1825. Min. Con., vol. v, p. 54, tab. 438, fig. 2.
— — *D'Orb.* 1849. Prodrome, vol. i, p. 376; vol. ii, p. 24.
— — *? Zieten.* 1832. Die Verst. Wurttemb., t. 39, fig. 6.
— — *Deslongchamps.* 1837. Soc. Lin. de Normandie.

Diagnosis. Shell inequivalved, elongated, irregularly oval; valves almost equally convex; beak small, recurved, truncated by a small foramen almost touching the umbo, and concealing the deltidium; lateral ridges indistinct; margin of valves almost straight, front slightly produced, and laterally compressed or pinched; surface smooth and punctuated. Length 13, width 12, depth 8 lines.

Obs. I am indebted to Mr. J. de C. Sowerby for the loan of the original specimens illustrated in Plate XIII, fig. 8, obtained from *Coralline Oolite* or *Calcareous Grit* of Malton, and, according to M. D'Orbigny,[1] it would likewise occur in the Oxford clay, which is not unlikely, as several species have been found in both deposits. Von Buch,[2] Morris,[3] Brown,[4] and others, believe it to be only a synonym of *T. bullata*, Sow., but I am not prepared to admit the fact, as *T. bucculenta* appears to differ from any true specimens of *Ter. bullata* and *spheroidals*, a species peculiar to the Inferior Oolite of many localities.

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[1] *D'Orbigny.* 'Prodrome,' 1849.

[2] 'Mém. Soc. Géol. de France,' vol. iii, 1^{ere} Série, 1838, p. 195.

[3] *Morris.* Catalogue, 1843, p. 132.

[4] Index Palæontologicus, vol. ii, p. 1231.

53. Terebratula sphæroidalis, *Sow.* Plate XI, figs. 9, 19.

Terebratula sphæroidalis, *Sow.* 1825. Min. Con., vol. v, p. 49, tab. 435, fig. 3.
— bullata, *Sow.* 1825. Min. Con., vol. v, p. 49, tab. 435, fig. 4.
— — *Deslongchamps.* 1837. Soc. Lin. de Normandie.
— sphæroidalis, *Deslongchamps.* 1837. Soc. Lin. de Normandie.
— bullata, *Desh.* 1836. Nouv. ed. des Animaux sans Vert. de Lamarck, vol. vii, p. 362.
— — *V. Buch.* 1838. Mém. de la Soc. Géol. de France, vol. iii, 1$^{\text{ere}}$ Série, p. 195, pl. xviii, fig. 8.
— — *Zieten.* 1832. Dei Verst. Wurttemberg, tab. xl, fig. 6.
— sphæroidalis, *Morris.* 1843. Catalogue, p. 136.
— bullata, *Morris.* 1843. Catalogue, p. 132.
— — *Bronn.* 1849. Index Palæont., p. 1231 (but exclude all the other synonyms given).
— sfhæroidalis, *D'Orb.* 1849. Prodrome, vol. i, p. 287.

Diagnosis. Shell inequivalved, more or less circular and spheroidal; beak small, much recurved, and truncated by a moderately-sized circular foramen, almost touching and advancing on the umbo; lateral ridges indistinct; margin lines of valves more or less straight or curved, with or without a slightly sinuated front; surface smooth and punctuated. Loop short, attached simply to crura, and extending to about half the length of the valve; length 15, breadth 12, depth 12 lines.

Obs. From the study I have made of the original types of Sow., I believe *T. sphæroidalis* and *T. bullata* both to belong to one species, and as *T. sphæroidalis* is the first described, we have given it the preference; but authors have not in general understood the Sowerby type. Von Buch, while adopting *T. bullata*, places *T. sphæroidalis* as a synonym of *globata.* Prof. Bronn and M. D'Orbigny have also erred on this subject by placing *T. bullata* and *sphæroidalis* as synonyms of *T. Kleinii*, Lamarck. *T. sphæroidalis* (as I understand the species) is a very variable shell, some of its varieties differing much from the common shape, but inseparable in my opinion; a few of these are illustrated in Plate XI, showing it to be a more or less convex, globular, elongated, or flattened shell; figs. 9 and 19 are Sowerby's types drawn from the original specimens, the first *T. sphæroidalis*, the second *T. bullata;* it will also be seen from figs. 9, 10, 12, 13, 15, 16, 18, and 19, that the frontal margin line of valves is in some straight (fig. 9), in others forming either a convex or concave curve (in figs. 10, 14, 16, &c.), while in some differently sinuated (figs. 12, 13), but not in general interrupting the regular convexity of the valves in front. In some instances, nevertheless, as in fig. 19, two or more slightly produced rounded costæ proceed a little way from the front towards the umbo and beak; leaving an obscure furrow on each valve, but never as deeply biplicated as in *T. globata;* this is an exceptional character in the species under consideration. The internal loop is in all the same, and we are much indebted to my friend M. Deslongchamps for having forwarded to us perfectly worked out interiors of this shell. It attains considerable dimensions in some localities; the two largest specimens I am acquainted with are one in the British Museum, and the other in the possession of M. Bouchard; they resemble a billiard ball in form, measuring 23 lines in length, 22 in breadth, and 21 in depth; our British specimens do not attain these dimensions. In general, the convexity is regular from the umbo and beak to the front; but in some cases, after attaining certain dimensions, a temporary stoppage in growth takes place, which, on being resumed, has caused the remaining portion of the shell to deviate from the regular line, as in fig. 15. This is also the case in many specimens which are smooth and regularly circular up to a certain period, but after a pause continue their growth by giving birth to plaits or other ornaments, as we meet commonly in *T. fimbria plicata*, &c.

The lines of growth are likewise more or less prominent in different specimens.

As stated by Sowerby, *T. sphæroidalis* is found in the Inferior Oolite of Dundry, Nunney, near Frome, in different parts of Somersetshire, in Normandy, Bayeux, Curcy, Monstiers, St. Maixant, as well as in Germany, and at Allen, Stuifenberg, &c.

54. TEREBRATULA GLOBULINA, *Dav.* Plate XI, figs. 20, 21.

Diagnosis. Shell inequivalve, globular, regularly convex, and gibbous; beak small, scarcely prominent, recurved, and truncated by a diminutive foramen almost touching the umbo; lateral ridges distinct, recurving to join the hinge line; margin straight all round; valves almost equally convex, smooth, and punctated; loop short, attached only to crura; length 2, breadth 2, depth 1 line.

Obs. In 1847 I illustrated this small species,[1] but I did not at that period think it prudent to distinguish it by a specific denomination, as we believed it might only turn out to be the young of some species; but from the great number of adult specimens found by Mr. Moore, none of which exceed the dimensions above given, I have given to it the name of *globulina.* It is found in the Upper Lias in the same bed that contains *T. pygmea, Lept. Moorei, liasiana, Bouchardii,* &c., in the neighbourhood of Ilminster, and its discovery is due to Mr. Moore. Fig. 20 natural size, fig. 21 enlarged.

55. TEREBRATULA PYGMEA, *Morris.* Plate XIII, 16, 16 *a, b, c.*

TEREBRATULA PYGMEA, *Morris.* 1847. Annals and Mag. of Nat. Hist., vol, xx, pl. xix, fig. 3, *a, b.*
— — *D'Orb.* 1849. Prodrome, vol. i, p. 221.

Diagnosis. Shell inequivalved, of a somewhat hexagonal form; valves convex, beak small, recurved, and truncated by a diminutive foramen; lateral ridges distinct, recurving to join the hinge margin, with large longitudinal mesial fold in smaller valve, and corresponding sinus in larger one, and two lateral rounded plaits, with furrows corresponding to these in the rostral valve; front deeply sinuous, the central sinus by far the largest; surface smooth, punctuated; loop short; length 2, width 2, depth 1 line.

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[1] Annals and Mag. of Nat. Hist., vol. xx, pl. xix, fig. 4.

Obs. This small species, described and figured in 1847 by Mr. Morris and myself, was stated to come from the Leptæna bed of or above the marlstone in the neighbourhood of Ilminster; we do not, therefore, see why M. D'Orbigny places it in the Lower Lias or his *Terrain sinémurien*, where we do not find it. Since the period above alluded to, it has been obtained from similar beds in the neighbourhood of Pic de Saint Loup, near Montpellier, in France, along with *Leptæna liasiana* by M. Bouchard, and also at Croisilles, in Normandy, by M. Deslongchamps, though of the same dimensions as *T. globulina*, it is easily distinguished by its sinuated front; we are also indebted to the researches of Mr. Moore for the discovery of this species. Fig. 16, natural size, 16 *a*, *b*, *c*, enlarged illustrations.

56. Terebratula Bentleyi, *Morris, MS.* Plate XIII, figs. 9, 10, 11.

Diagnosis. Shell inequivalved, irregularly pentagonal, decussated, notched and sinuated in front; perforated valve convex, with two rounded costæ proceeding from the extremity of the beak, and regularly diverging to the front, separated by a deep medio-longitudinal sinus, and two lateral ones; beak keeled, recurved, produced, and obliquely truncated by an elongated apicial foramen, separated from the umbo by a deltidium in two pieces; lateral ridges well defined and continued along the sides without recurving to join the hinge margin, leaving between it and the hinge line a somewhat flat false area. Smaller valve slightly convex and depressed, subtrilobated, with three rounded costæ, one central, two lateral, divided by four grooves or sinuses proceeding from the umbo; the central rounded plait rising only at some distance from the umbo, the others being larger and more elevated than the central one; surface smooth, punctuated, and marked by numerous lines of growth. Length 16, width 18, depth 11 lines.

Obs. This is a very remarkable species not hitherto described, but found by the Rev. A. W. Griesbach, Messrs. Bentley, Morris, and others, in the Cornbrash of Wallaston and Rushden, in Northamptonshire, associated with *T. intermedia lagenalis*, *obovata*, and other well-known Cornbrash fossils, it has been met with in Lincolnshire, and I have it likewise from France and Germany: it somewhat approaches in form to some specimens of *T. coarctata*, but differs by many characters, especially by having its surface smooth, which is not the case in the last-named species. We are not acquainted with its loop, but judging from the external appearance of the shell would imagine it to be short, as in *T. coarctata*. The two fine specimens illustrated in our plate belong to the Rev. A. W.

Griesbach and Mr. Morris; it is named after Mr. Bentley, at the request of Mr. Morris: a fine specimen is to be seen in the collection of Mr. Lee. *T. Bentleyi* is a rare species, at least in England, few specimens having been as yet discovered.

T. Bentleyi. Var. Sub-Bentleyi, *Dav.* Plate XIII, fig. 11.

We are indebted to Mr. Lycett for the discovery of the larger valve of a terebratula which we believe to be only a well-marked variety of the above-described species, to which it approaches by general character; its shape, however, is more elongated, deeper, and the medio-longitudinal sinus, in appearance, extends only to a short distance from the front; the lateral beak ridges are also less defined than in *T. Bentleyi.* Unfortunately we are only acquainted with one of the valves of this shell, which may, perhaps, prove specifically distinct when the other is obtained. Its stratigraphical position is likewise very different, belonging to the Inferior Oolite of the neighbourhood of Minchinhampton, where it seems rare; the dimensions are larger than those of *T. Bentleyi,* measuring in length 22, in breadth 18 lines. Fig. 11 is from the collection of Mr. Lycett.

57. Terebratula coarctatus, *Parkinson.* Plate XII, Figs. 12—15.

Terebratula coarctatus, *Parkinson.* 1811. Organic Remains, vol. iii, pl. xvi, fig. 5.
— reticulata, *Smith.* 1816—1819, Strata identified by Organised Fossils, p. 83, pl. xxx, fig. 10.
— decussata, *Lamarck.* 1819. Anim. sans Vert., vol. vi, No. 51. Enc. Méthodique, t. 245, fig. 4.
— — *Dav.* Annals and Mag. of Nat. Hist., June 1850, pl. xiv, fig. 51.
Terebratulites reticularis, *Schloth.* 1820. Petref., vol. i, p. 269.
Terebratula coarctata, *Sow.* 1823. Min. Con., vol. iv, p. 7, tab. 312, figs. 1—4.
— reticulata, *Sow.* 1823. Min. Con., vol. iv, p. 8, tab. 312, figs. 5—6.
— decussata and reticulata, *Deslongchamps.* 1837. Soc. Linn. de Normandie.
— reticularis, *V. Buch.* 1838. Mém. Soc. Géol. de France, vol. iii, 1^{ere} Série, p. 185, pl. xvii, fig. 7.
— decussata, *Morris.* 1843. Catalogue, p. 132.
— — *Tennant.* 1847. Stratigraphical List of British Fossils, p. 73.
— coarctata, *Bronn.* 1849. Index Palæont., vol. ii, p. 1232.
— — *D'Orb.* 1849. Prodrome, vol. i, p. 316.

Diagnosis. Shell inequivalved; subpentagonal, valves convex, sometimes gibbous, hisped, decussated, and notched in front; perforated valve biplicated, with a more or less deep angular sulcus between the plaits, extending from the extremity of beak to the front; beak moderately produced, truncated by a large entire circular foramen, separated from the umbo by a more or less wide deltidium, often receding; beak ridges indistinct. Smaller valve convex, subtrilobated with medio longitudinal plait; surface of valves covered by a great number of short tubular spines, arranged longitudinally so as to form minute elevated striæ, intersected by transverse lines, giving the whole surface a reticulated appearance; structure punctuated, and marked by well-defined lines of growth.

Loop short, attached simply to crura, and not extending to half the length of the shell. Length 12, width 11, depth 8 lines.

Obs. As may be perceived from the list of synonyms here given, this species has received three principal names, indiscriminately made use of by various authors; however, that of *T. coarctata,* established by Parkinson in 1811, appears the oldest and only one to be retained, as *T. reticulata* of Smith and *decussata* of Lamarck, are of a later period.

Mr. Sowerby, in 1823, proposed to retain both *T. coarctata* and *T. reticulata,* which he thus characterises:—"*Ter. coarctata* subpentagonal, gibbous, hisped, and decussated; lesser valves convex, subtrilobated; larger valve biplicated, with a deep angular sulcus between the plaits. *Ter. reticulata* obovate, gibbose, subhisped, decussated, front obscurely three-sided, with a shallow channel between the ridges."

These distinctions are not sufficiently constant to authorise the proposed separation, but are simple variations seen so usually in almost every species; and in plate XIII we have given illustrations of both varieties—fig. 12 representing *Ter. coarctata,* and fig. 15 *T. reticulata,* according to Mr. Sowerby; fig. 15 also exhibits a very unusual form of beak in this species, which is strongly recurved, with the foramen almost touching the umbo. The general character of the beak is much less recurved. This species is likewise figured by Mr. Walcot.[1] The surface, or spinose striæ ornamenting the surface, are very remarkable, giving the shell a rough appearance; and, as may be seen from the enlarged fragments (fig. 14), these short and thick spines arise from under each other along the elevated ridge; they are rarely preserved intact, but rubbed down so as to give the shell a striated appearance: their hollow tubular character is noticed by Mr. Sowerby. We are indebted to M. Deslongchamps for the interior, showing the loop, which is short in this species.

Ter. coarctata is abundantly found in the Great Oolite, Forest Marble, and Bradford Clay, all round Bath, Bradford, Hinton, Frome, &c., where it does not seem to exceed the dimensions we have given: it is also a common species in beds of the same age on the Continent, and especially round Caen, in Normandy. Fine specimens have, likewise, been met with by M. Bouchard, near Boulogne-sur-mer. Mr. Walton informs me that he has found this species in the Oxford Clay, but where it is very rare.

58. TEREBRATULA PLICATA, *Buckman,* 1845. Plate XII, figs. 1—5.

TEREBRATULA PLICATA, *Buckman.* 1845. Geol. of Cheltenham, pl. 7, fig. 6. (Non *Ter. plicata,* Lamarck, 1849. An. sans Vert., vol. vi, No. 39, which belongs to another genus.)

— — *Tennant.* 1847. A Stratigraphical List of British Fossils, p. 74.

— SUBPLICATELLA, *D'Orb.* 1849. Prodrome, vol. i, p. 287.

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[1] Petrifactions found near Bath, No. 28.

Diagnosis. Shell inequivalved, elongated, oval, tapering posteriorly; valves convex, sometimes gibbous; beak small, not much recurved, truncated by a circular entire foramen, deltidium small, receding; lateral ridges indistinct. Surface of valves smooth, up to a certain age slightly undulating, or plaited towards the margin at a more advanced period. Structure punctuated, loop short. Length 33, width 22, depth 17 lines.

Obs. The term *plicata* has been given by Lamarck, Borson, and Say, to different shells placed by them in the genus *Terebratula,* but which belonging to different genera are only synonyms of other species; therefore, we think Mr. Buckman's name, though of a later date, may be retained, and that of Lamarck preserved for his species, which will have to be placed in Fischer's genus *Rhynchonella.* M. D'Orbigny proposes to change Mr. Buckman's name to that of *Subplicatella,* which I would have readily adopted, but for the reason above given. *Ter. plicata* is quite smooth up to a considerable age, when the frontal and lateral edges become more or less undulated or plaited; they never extend very high up on the valves, but are restricted to near the edge, forming an irregular frill round the shell, as seen in figs. 1 and 2. The plaiting in this species is very similar to that of *Ter. fimbria;* but both species seem distinct. *T. fimbria* is much smaller, rounder, and has not got that tapering of the posterior portion, so peculiar to *T. plicata,* which is likewise a much larger shell.

Ter. plicata is found along with *T. fimbria* in some of the beds in the Inferior Oolite, in the neighbourhood of Cheltenham, Minchinhampton, &c., where many fine species have been obtained by Dr. Wright and Messrs. Lycett, Buckman, Walton, Morris, and others; the three largest specimens with which we are acquainted may be seen in the collection of the Geological Society and in those of Messrs. Morris and Buckman.

It has also been found at Tournus (Saône et Loire), in France, by M. D'Orbigny.

Fig. 1 is from a specimen in the Collection of the Geol. Soc.; fig. 2 from the collection of Professor Buckman; fig. 5 from that of Dr. Wright.

59. Terebratula fimbria, *Sowerby.* Plate XII, figs. 6—12.

Terebratula fimbria, *Sow.* 1823. Min. Con., vol. iv, p. 27, tab. 326.
— — *Morris.* Catalogue, 1843, p. 133.
— — *Bronn.* 1849. Index Palæont., vol. ii, p. 1236.
— — *D'Orb.* Prodrome, vol. i, p. 287, 1849.

Diagnosis. Shell inequivalved, orbicular; beak short, slightly recurved, and truncated by a circular foramen, almost touching the umbo, and generally concealing the deltidium; lateral ridges indistinct, valves almost equally convex, sometimes gibbous, smooth in the young state, irregularly undulato-plaited at a more advanced age towards the margin; structure punctuated. Loop simply attached to crura, and extending to less than half the length of the shell. Length 20, breadth 18, depth 13 lines.

Obs. Sowerby's figures of *T. fimbria* illustrate only one of the states in which we find this species; nor does it appear to attain much larger dimensions than those given above (fig. 6). In the young state, and sometimes up to a considerable period of growth, the shell is quite smooth, without any plaits or ornaments, the margin line being straight all round (fig. 11); but in some rare cases, even when young, the ornaments of its surface are slightly perceptible (fig. 12); at a more advanced period the surface of the valves, towards the edge, becomes irregularly undulated, much in the way of a frill, as stated by Sowerby, but not extending to the hinge-margin, which is always smooth, and regularly curved and rounded. Nothing can be more irregular than the manner in which these ornaments are presented in different specimens, as may be perceived by the several illustrations we have selected; at times, the whole surface of the valves is regularly rounded to near the edge (figs. 6, 12); at other times, the smooth part is partially separated from the plaited portion by a marked line of growth and a difference in level (figs. 2, 10), proving that there was a sudden stoppage in growth, which, on being resumed, the shell from smooth became undulated, or differently plaited. Sometimes, before the stoppage alluded to, the shell had already become frilled, but on continuing the growth at a different level these ornaments became differently disposed, having no continuity with the ones already formed, as in fig. 10. These undulating plaits are also very irregular in their form, in some cases a few small plaits are succeeded by a large one widely separated, others close together: sometimes taking rise at about half the length of the valve, and, after proceeding to some distance, separated into two or more bifurcations irregularly disposed (figs. 7, 8).

The bifurcated plaits do not always reach the front, one or more disappearing at a short distance from their origin, while some smaller plaits, at times, also appear between the larger ones, so as to produce in that part of the shell a kind of irregular zig-zag aspect.

Ter. fimbria is very abundant in certain beds of the Inferior Oolite in different parts of Gloucestershire, near Cheltenham, Minchinhampton, &c., whence many fine series have been obtained by Dr. Wright, Messrs. Buckman, Lycett, Walton, Morris, and others; it is common in most collections. We have not yet observed this species in any of the Continental localities; but it is probable future researches may lead to its discovery, since *T. plicata*, a species closely allied to it, has been found in France by M. D'Orbigny.

Fig. 7 is from the collection of Professor Buckman; fig. 8 from that of Dr. Wright.

60. TEREBRATULA FLABELLUM, *Defrance*. Plate XII, fig. 19—21.

TEREBRATULA FLABELLUM, *Def.* Dic. des Sciences Nat., vol. liii, p. 160, 1828.
— PALMETTA, *Deslongchamps*. 1837. Soc. Linn. de Normandie.
— FLABELLUM, *Morris* and *Dav.* Annals and Mag. of Nat. Hist., 1847, p. 256, pl. xix, fig. 2.
— PALMETTA, *Bronn*. 1849. Index Palæont, p. 1244.
— FLABELLUM, *D'Orb*. 1849. Prodrome, vol. i, p. 316.

Diagnosis. Shell inequivalved, somewhat transversely oval, perforated valve, more convex than the other, with a produced beak, truncated by a rather large circular foramen; deltidium obtusely triangular, and in two pieces; cardinal or false area concave, nearly smooth; valves costated; seven or nine round costæ imbricated, increasing in size, not in number, towards the margin. The central medio-longitudinal plait larger than the lateral ones; shell punctuated, marked by numerous lines of growth; loop short, simply attached to crura, and extending to about half the length of the shell; dimensions variable. Length 5, breadth 5, depth 3 lines; but some foreign species measure, length 6, width 8, depth 4 lines.

Obs. This species seems to have been first described by M. Defrance, under the name of *T. flabellum*, but it is better known by that of *T. palmetta* to French Geologists; and was only within a few years noticed in England: it occurs in the Bradford Clay, of Bradford and Corsham, Wilts, where it was found by Messrs. Walton, Pearce, and Waterhouse. In France it is met with in the Oolite of Ranville, at Luc, and Langrune, near Caen, where it attains very large dimensions; and I am indebted to my friend, M. Deslongchamps, for working out the interior. This species belongs to the *Loricatæ* of Von Buch, in which the ribs of the smaller valve envelope those of the larger. *Ter. flabellum* is also remarkable for its rare variability; it is always easily recognised, being rather a scarce species, especially in England. Figs. 20 and 21 of our plate are enlarged.

Genus—TEREBRATELLA, *D'Orb.* 1847.

Diagnosis. Shell inequivalved, oval, sometimes transverse, larger valve more convex than the smaller or imperforated one, which is in many cases flatter; cardinal edge straight or slightly curved; a well-defined rather flat hinge area existing in larger valve, beak commonly straight and truncated by a foramen of an oval or irregularly triangular shape placed more under than above the summit, formed out of a small portion of the substance of the beak; cardinal area and triangular deltidium in two pieces, which are disunited in many cases, the aperture being completed by a small portion of the umbo. Structure punctuated, surface striated or plaited, often bifurcating; hinge articulating by means of two teeth in larger and corresponding condyles in smaller valve. Loop generally long, doubly attached, proceeding from the crura, but before attaining its greater length it gives off a flat, wide, more or less horizontal process, likewise attached to a central longitudinal elevated septum, the principal lamella proceeding till it doubles itself in the shape of a loop, as in true terebratulæ.

Obs. We are only acquainted with one British Jurassic species attributable, according to M. D'Orbigny, to this genus, viz. *Terebratella hemisphærica,* Sow.

61. Terebratella hemisphærica, *Sow.* Plate XIII, figs. 17, 18.

Terebratula hemisphærica, *Sow.* 1829. Min. Con., vol. vi, p. 69, tab. 536, fig. 1.
— — *Deslongchamps.* 1837. Soc. Linn. de Normandie.
— — *Morris.* 1843. Catalogue, p. 133.
— — *Bronn.* 1849. Index Palæont., p. 1238.
Terebratella — *D'Orb.* 1849. Prodrome, vol. i, p. 316.

Diagnosis. Shell inequivalved, hemispherical; beak produced, recurved, truncated by a large oval foramen placed more under than above the apex of the beak, encircled by a portion of the extremity of the beak, cardinal area, disunited triangular deltidium, and summit of the umbo of smaller valve, which is commonly quite, or nearly flat; hinge line slightly arched; structure punctuated; surface of valves ornamented by numerous small longitudinal elevated striæ often bifurcating. Loop said to be doubly attached to crura and to central longitudinal septum. Length 4, width $3\frac{1}{2}$, depth 2 lines.

Obs. Von Buch is in error when stating in his valuable Monograph of Terebratulæ that this species is only a synonym of *T. gracilis,* a cretaceous shell easily distinguishable from *T. hemisphærica;* in shape and characters it is a well-defined species, varying less than most oolitic shells; however, although its great and common character is to have an almost flat imperforated valve, still in some specimens, and especially in many from Normandy, this valve is more or less convex.

Notwithstanding my own and M. Deslongchamps' endeavours we have not been able to clear a specimen, so as to see the interior loop in a satisfactory manner, and therefore have placed it in the present genus, more on M. D'Orbigny's authority than our own, as we consider a knowledge of the form and position of the process absolutely necessary to be able to state positively to what genus or subgenus of the great family of Terebratulæ each species belongs.

Terebratella hemisphærica is found in the Great Oolite of Hampton Cliff, near Bath, and at Luc and Langrune, near Caen, in which last locality M. Deslongchamps obtained some specimens larger than any hitherto found in England, where it does not seem to exceed the dimensions above given. Fig. 17 natural size; fig. 18 are considerably enlarged illustrations.

PLATE I.

Fig.	
1.	Lingula Beanii, *Phil.*, natural size.
1*a, b.*	„ „ interior of larger valve.
1*c, d.*	„ „ „ smaller valve.
2*a, b.*	Orbicula Townshendi, *Forbes*, MS., natural size.
3.	Orbicula Humphresiana, *Sow.*, natural size.
3*a, b.*	„ „ enlarged illustrations.
4. 5. 6. 7.	Crania antiquior, *Jelly*, natural size.
8.	„ „ an enlarged illustration.
9.	Crania Moorei, *Dav.*, natural size.
9*a, b.*	„ „ enlarged illustrations of the upper valve.
10.	Thecidea Moorei, *Dav.*, several specimens attached to *Rhynchonella serrata.*
10*a, b, c, d, e.*	„ „ enlarged illustrations.
11.	Thecidea triangularis, *D'Orb.*, natural size, from the Lias.
11*a, b.*	„ „ enlarged figures.
12.	„ „ natural size, from the Inferior Oolite.
13.	Thecidea Mediterraneum, *Risso*, recent species, natural size.
14.	Thecidea rustica, *Moore*, MS., natural size.
14*a, b.*	„ „ enlarged representations of the exterior and interior of the smaller valve.
15.	Thecidea Bouchardii, *Dav.*, natural size, from specimens found in the Lias near Ilminster.
15*a.*	„ „ enlarged interior of attached valve.
16.	„ „ } enlarged illustrations of *Th. Bouchardii.*
17.	„ „
18.	Leptæna Moorei, *Dav.*, natural size, Upper Lias, Ilminster.
18*a, b, c, d, e.*	„ „ enlarged illustrations of exterior and interior of both valves.
19.	Leptæna Pearcei, *Dav.*, natural size, from a specimen found in the Upper Lias.
19*a, b.*	„ „ enlarged illustrations.
20.	Leptæna granulosa, *Dav.*, natural size, from the Upper Lias.
20*a, b.*	„ „ enlarged illustrations.
21.	Leptæna liasiana, *Bouchard*, natural size.
21*a.*	„ „ enlarged figure.
22.	Leptæna Bouchardii, *Dav.*, natural size, from the Upper Lias, near Ilminster.
22*a, b.*	„ „ enlarged illustration of exterior of both valves.
22*c.*	„ „ „ „ of interior of smaller valve.

Pl. I

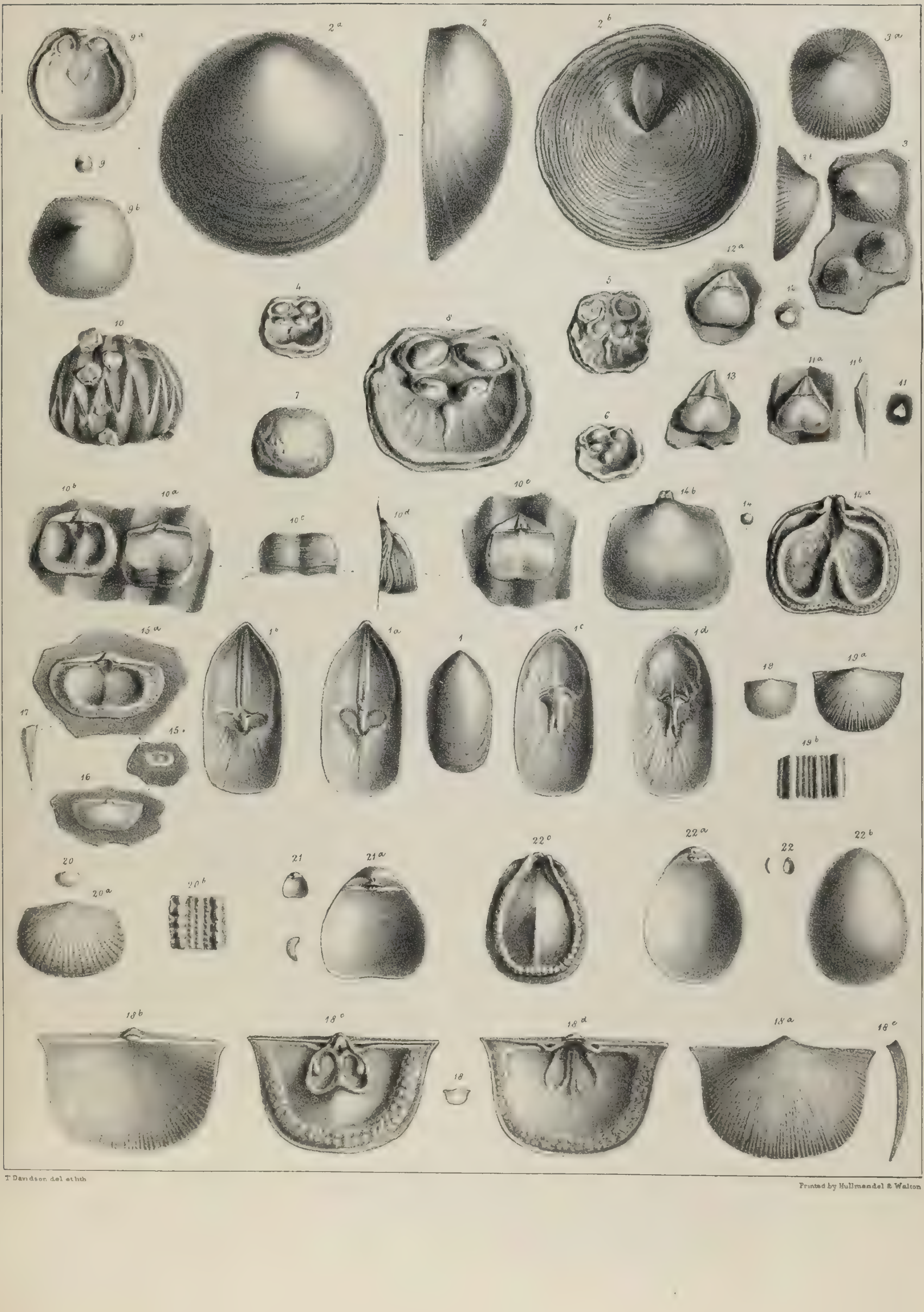

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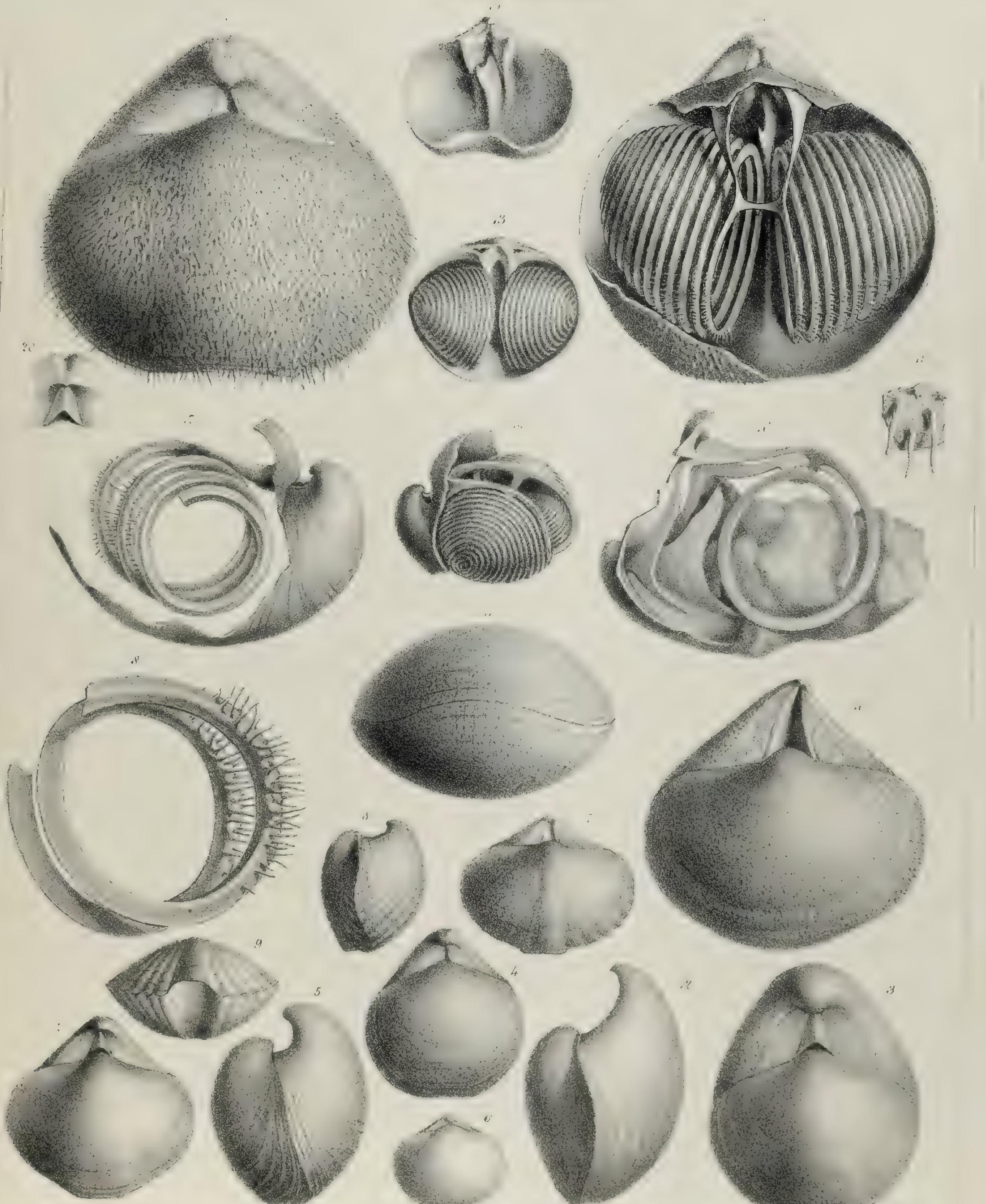
PLATE II.

Fig.			
1.	Spirifer rostratus,	*Schl.*,	the largest specimen known.
2.	,,	,,	from the Lias of Battle Down, near Cheltenham. *Sp. punctatus* (Buckman).
3.	,,	,,	an unusual form of this species.
4.	,,	,,	from a specimen found in the Upper Lias, near Ilminster.
5.	,,	,,	side view of a specimen from Ilminster.
6.	,,	,,	young shell.
7, 8, 9.	,,	,,	variety, with undulations, or rounded false plaits: *Spirifer pinguis* of Zieten, non *Sp. pinguis* of Sowerby.
10, 11, 12.	,,	,,	an unusual specimen.
13.	,,	,,	interior of smaller valve, as it would appear on separating the valves completely.
14.	,,	,,	side view of a specimen illustrating the spirals.
15.	,,	,,	interior of larger valve.
16.	,,	,,	enlarged illustration, showing the position and form of the central septum and dental plates of larger valve, relative to the spirals in smaller valve; also the lamella, or cross-piece uniting the two spirals.
17.	,,	,,	enlarged illustration of a portion of the lamella, facing the sides of the shell, showing that on that side there are no spines.
18.	,,	,,	enlarged view of the inner side of the lamella of the spirals, illustrating the manner in which the spines are placed.
19.	,,	,,	magnified portion of the exterior of the shell, showing the tubular spines and punctuation.
20.	,,	,,	enlarged fragment, showing the form and position of the deltidium in two pieces.
21.	,,	,,	magnified interior from a perfect specimen. In this figure a part of the smaller valve has been removed, so as to show the position of the spirals and cross-piece uniting them, as well as the relative position of the central septum of the larger valve and the position of the spines on the portion of the spirals facing the front of the shell.



13
20
8
9
5
4
2
3
6

PLATE III.

Fig.		
1*a*, *b*.	Spirifer rostratus, *Schl.*,	from the Lower Lias, near Cheltenham. Collection, Buchman. This is only a variety of *Spirifer rostratus*, described by V. Buch. and Zieten, under the name of *Sp. verrucosus.*
1*c*.	,, ,,	enlarged fragment.
2.	Spirifer Walcottii, *Sow.*,	the largest specimen with which I am acquainted, from the Lower Lias of Camerton, near Bath. Collection, Moore.
3.	,, ,,	a specimen from Radstock.
4.	Spirifer Münsterii, *Dav.*,	the largest specimen yet found in the marlstone of Ilminster. Collection, Moore.
4*a*.	,, ,,	interior of larger valve magnified.
4*b*.	,, ,,	interior of smaller valve.
5, 6.	,, ,,	two specimens from the same locality, illustrating the common size.
7.	Spirifer Ilminsteriensis, *Dav.*,	natural size, from a specimen found by Mr. Moore in the *Leptæna* bed of Ilmininster.
7*a*.	,, ,,	enlarged illustration.
8.	Terebratula quadrifida, *Lamarck*,	from the marlstone of Ilminster. Collection, Moore.
9.	,, ,,	Collection of Mr. Moore.
10.	,, ,,	deformed specimen.
11.	Terebratula cornuta, *Sow.*,	marlstone, Ilminster.
12.	,, ,,	Collection of Mr. Moore.
13.	,, ,,	from a specimen in British Museum.
14, 15, 16, 17.	,, ,,	different specimens from Ilminster.
18.	,, ,,	perfect interior, showing the loop magnified.
18*a*.	,, ,,	side view.
18*b*.	,, ,,	fragment, showing the crura and muscular impressions.

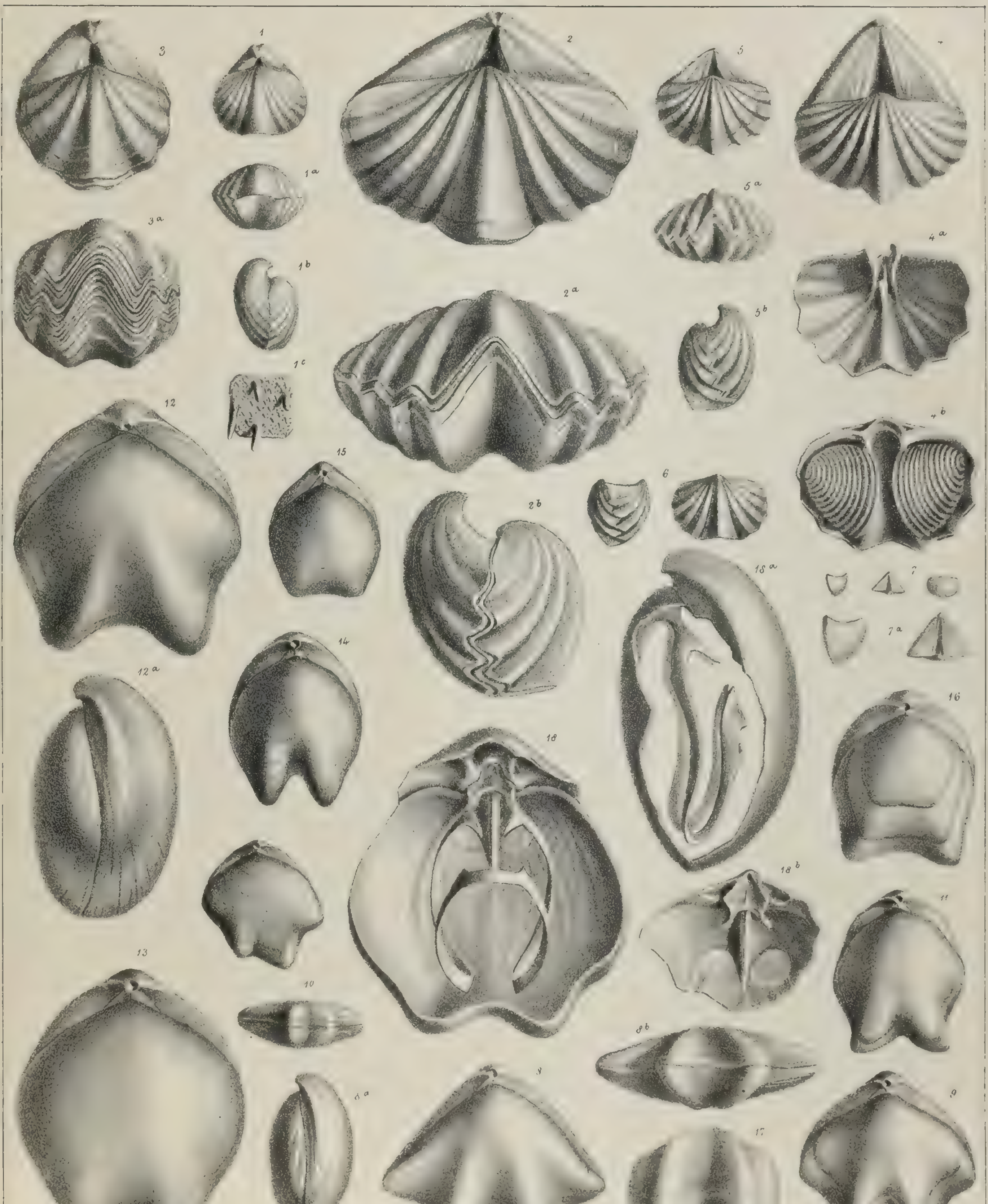


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PLATE IV.

Fig.		
1.	Terebratula resupinata, *Sow.*,	marlstone, Ilminster.
2.	,, ,,	interior, showing the loop and spines on its inner side, facing the front.
3, 4, 5.	,, ,,	different specimens, from the marlstone of Ilminster.
6.	Terebratula Moorei, *Dav.*,	marlstone of Ilminster.
7.	,, ,,	from the same locality.
8.	Terebratula impressa, *V. Buch.*,	from a specimen found in the Inferior Oolite of Cheltenham: this forms a passage from *T. resupinata* into *T. impressa*.
9, 10.	,, ,,	from the Oxford Clay of St. Ives.
11.	Terebratula carinata, *Lamarck*,	Inferior Oolite from near Stroud.
12.	,, ,,	from a specimen in the collection of the Geological Survey.
13, 14.	,, ,,	two specimens.
15, 16.	,, ,,	from the Inferior Oolite of Chalford.
17.	,, ,,	young shell.
18, 19, 20.	Terebratula emarginata, *Sow.*,	from the original specimens in the collection of Mr. J. de C. Sowerby, Inferior Oolite.
21.	,, ,,	a malformation.

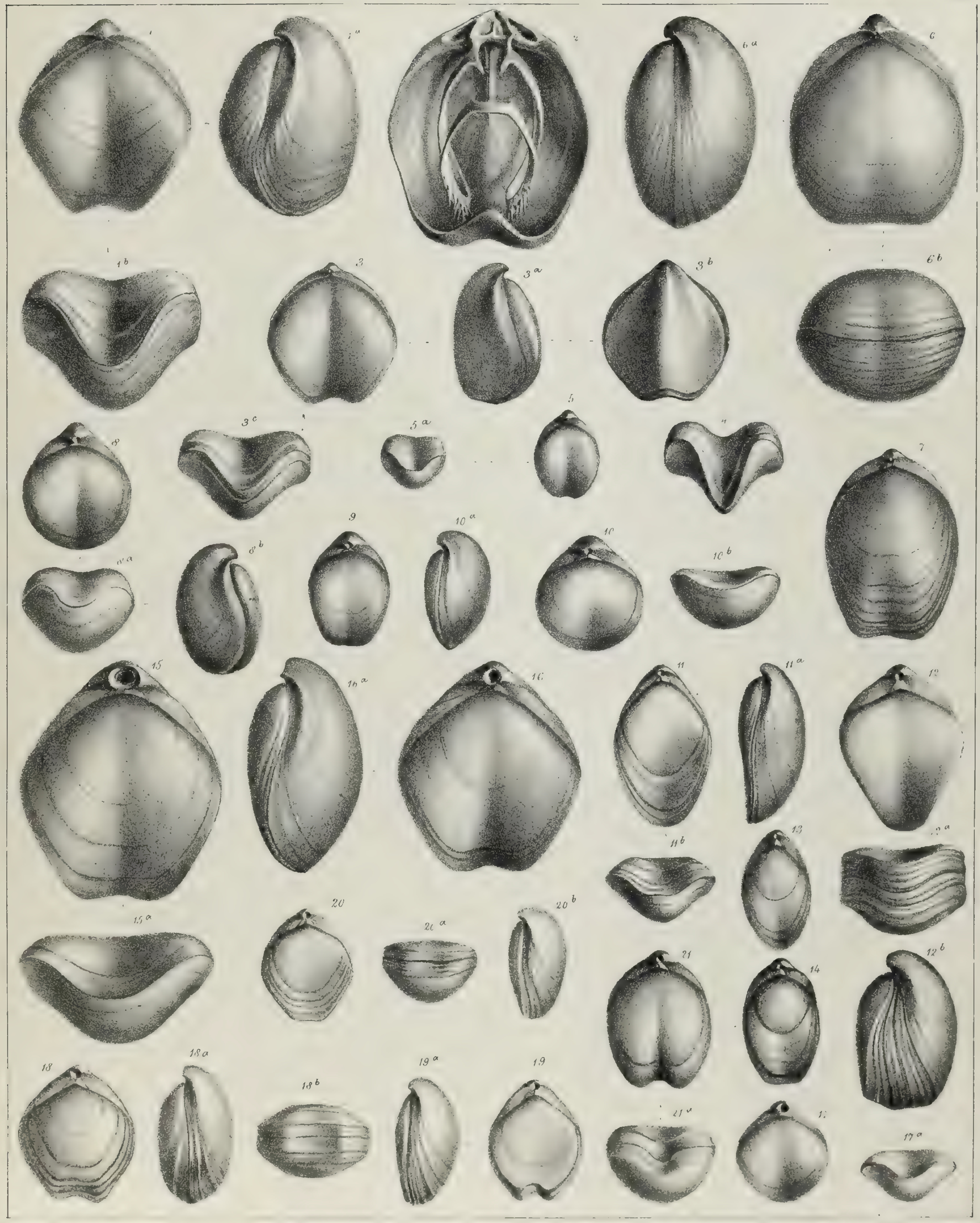

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PLATE V.

Fig.	
1, 2.	Terebratula Waltonii, *Dav.*, Inferior Oolite, Bath.
3.	,, ,, ,, ,,
4, 5, 6, 7.	Terebratula numismalis, *Lamarck*, several specimens from the Lias near Cheltenham and Farington Gurney.
8.	,, ,, a Scotch specimen.
9.	,, ,, interior, from the collection of M. Deslongchamps.
10.	,, ,, var. subnumismalis, from a specimen found by Mr. Moore, in the marlstone of Ilminster.
11.	Terebratula Bakeriæ, *Dav.*, Inferior Oolite, Bugbrook.
12, 13.	Terebratula Waterhousii, *Dav.*, from the Lias of Farington Gurney.
14.	Terebratula obovata, *Sow.*, interior, from the Wiltshire *Cornbrash.*
15.	,, ,, ,, ,,
16.	,, ,, from the original specimen now in the collection of Mr. J. de C. Sowerby.
17.	,, ,, a deformed specimen.
18.	Terebratula digona, *Sow.*, the original specimen from Mr. Smith's collection in British Museum: Great Oolite, Bath.
19.	,, ,, in British Museum.
20.	,, ,, interior, from the Bradford Clay of Cirencester.
21, 22.	,, ,, ,, ,,
23.	,, ,, a deformed specimen, in British Museum.
24.	,, ,, from the Forest Marble, near Bath.
25, 26.	Terebratula indentata, *Sow.*, two specimens from the Lias of Farington Gurney, in Mr. Walton's collection.

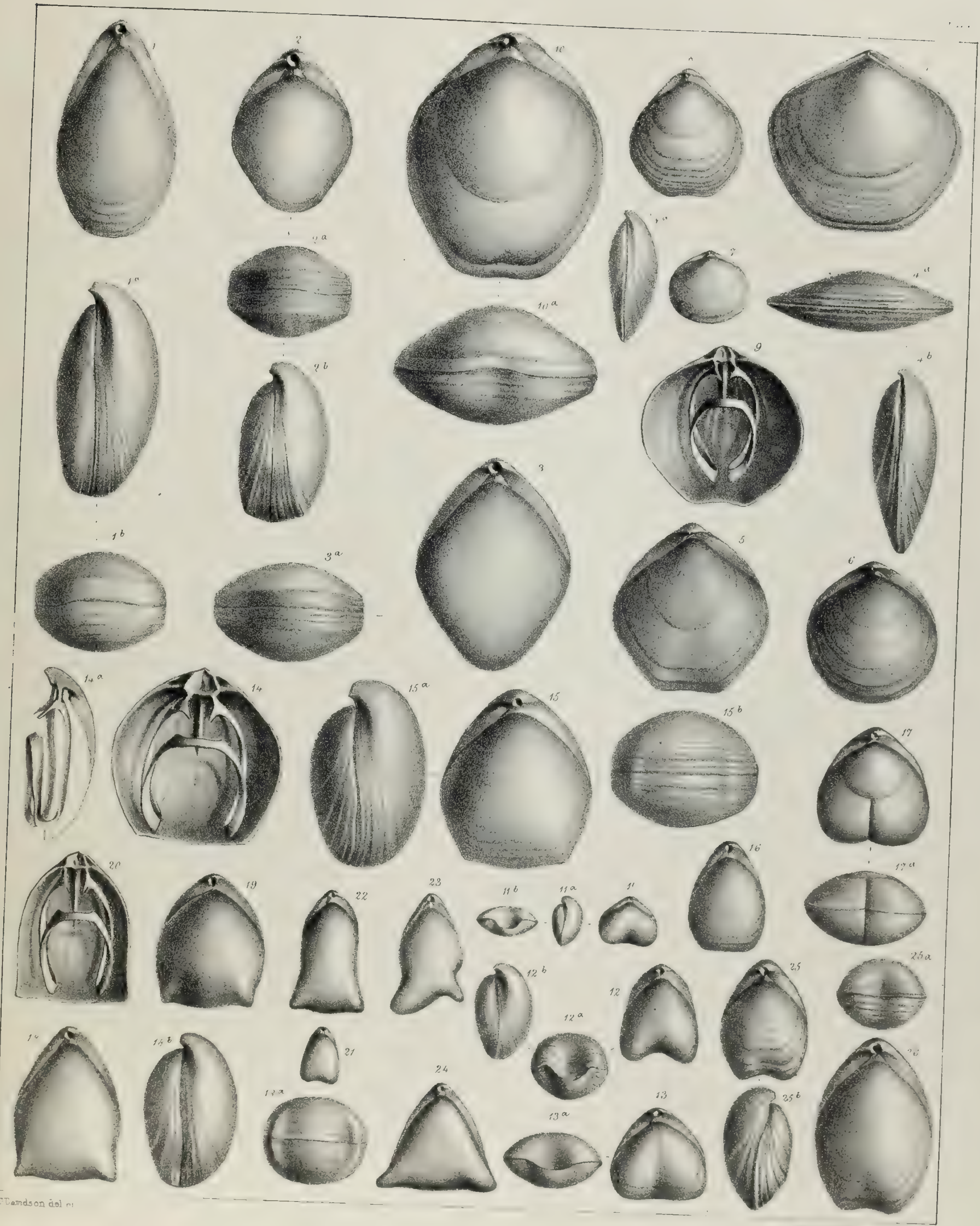

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PLATE VI.

Fig.	
1, 2.	Terebratula punctata, *Sow.*, from the original specimens now in the collection of Mr. J. de C. Sowerby.
3.	,, ,, interior, from the same collection.
4, 5.	,, ,, young shells, from Farington Gurney.
6.	,, ,, from the Lias Shale of Dumbleton, near Cheltenham.
7, 8, 9, 10.	Terebratula subpunctata, *Dav.*, from the marlstone of South Petherton.
11.	Terebratula Edwardsii, *Dav.*, from the marlstone of Ilminster.
12.	Terebratula subpunctata, a malformation.
13, 14.	Terebratula Edwardsii, ,,
15.	,, ,, ? from a malformation.
16.	Terebratula subpunctata? from a malformation.

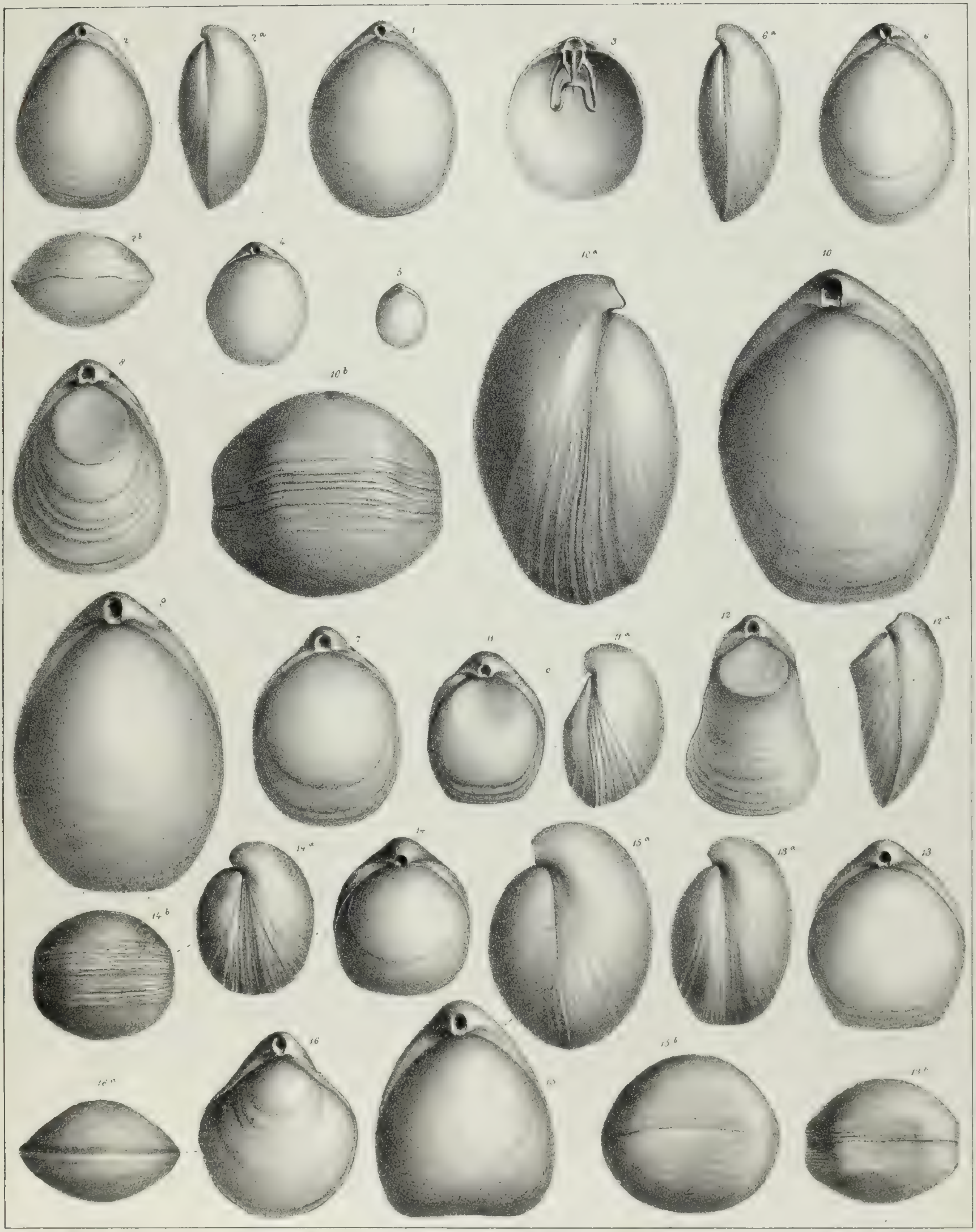
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PLATE VII.

Fig.	
1, 2.	Terebratula lagenalis, *Schl.*, from the Cornbrash of Rushdon.
3.	„ „ interior.
4.	„ „
5.	Terebratula obovata, *Sow.*, malformation, from the Cornbrash.
6, 7, 8, 9.	Terebratula ornithocephala, *Sow.*, from the Fullers Earth of Bath. 7. 8, from the Cornbrash of Rushden; in British Museum.
10, 11, 12, 13.	„ „ from Fullers Earth. 10, 11, are the original specimens of *T. triquetra*, Sow., from Mr. J. de C. Sowerby's collection.
14.	Terebratula sublagenalis, *Dav.*, in British Museum's collection.
15, 16.	Terebratula Buckmanii, *Dav.*, from the Inferior Oolite of Cheltenham.
17—22.	Terebratula Lycettii, *Dav.*, from the Upper Lias, near Ilminster.
23.	Terebratula ornithocephala, *Sow.*, interior, from the Kelloway Rock.

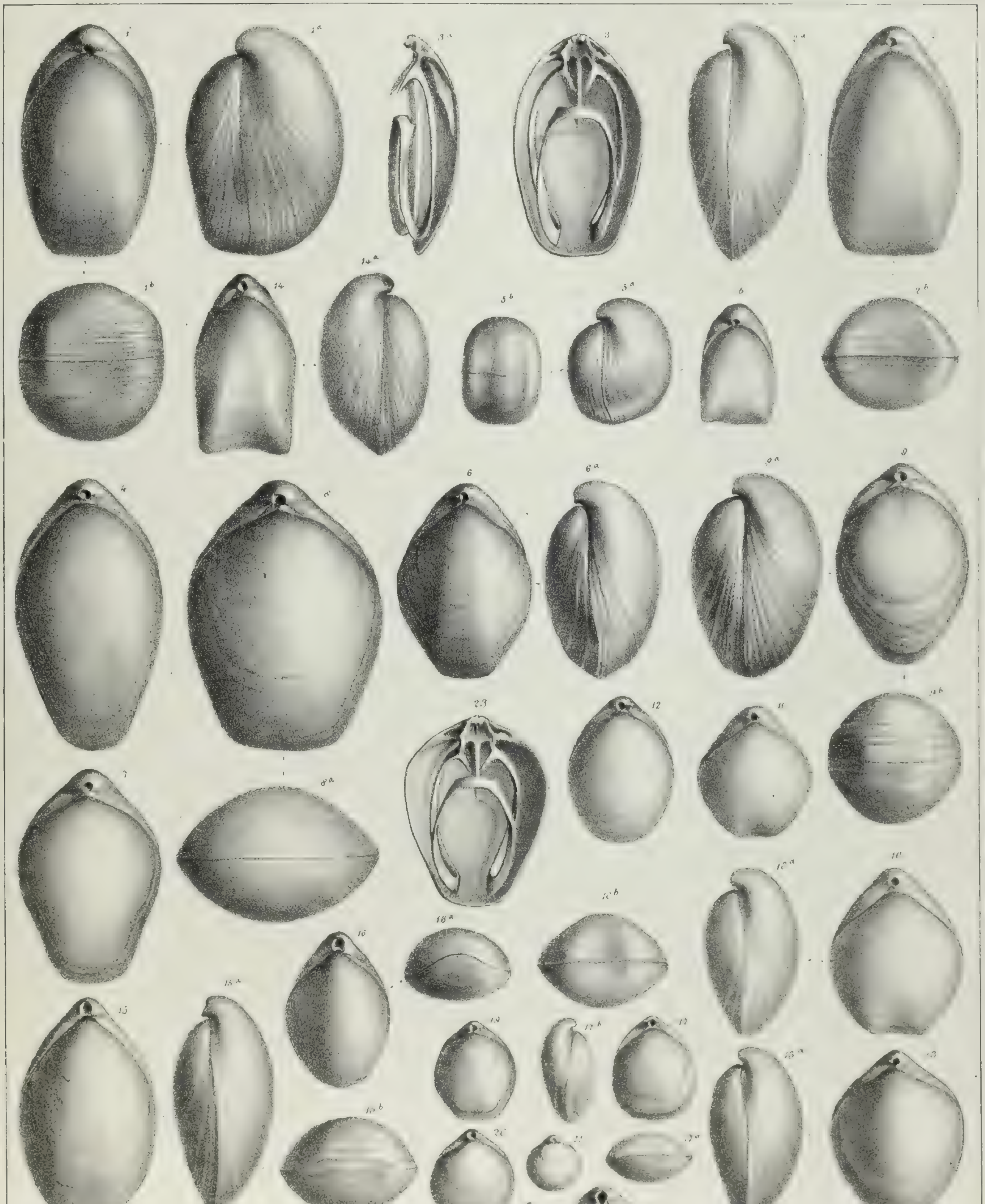

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PLATE VIII.

Fig.

1. Terebratula simplex, *Buchman.* Inferior Oolite. In the collection of the Geol. Society.

2. ,, ,,

3. ,, ,, Young shell.

4. Terebratula ovoides, *Sow.* *T. lata,* Sow.

5. ,, ,, *T. ovoides,* Sow.

6, 7. ,, ,, *T. trilineata,* Young and Bird.

8. ,, ,,

9. ,, ,, From Whitby.

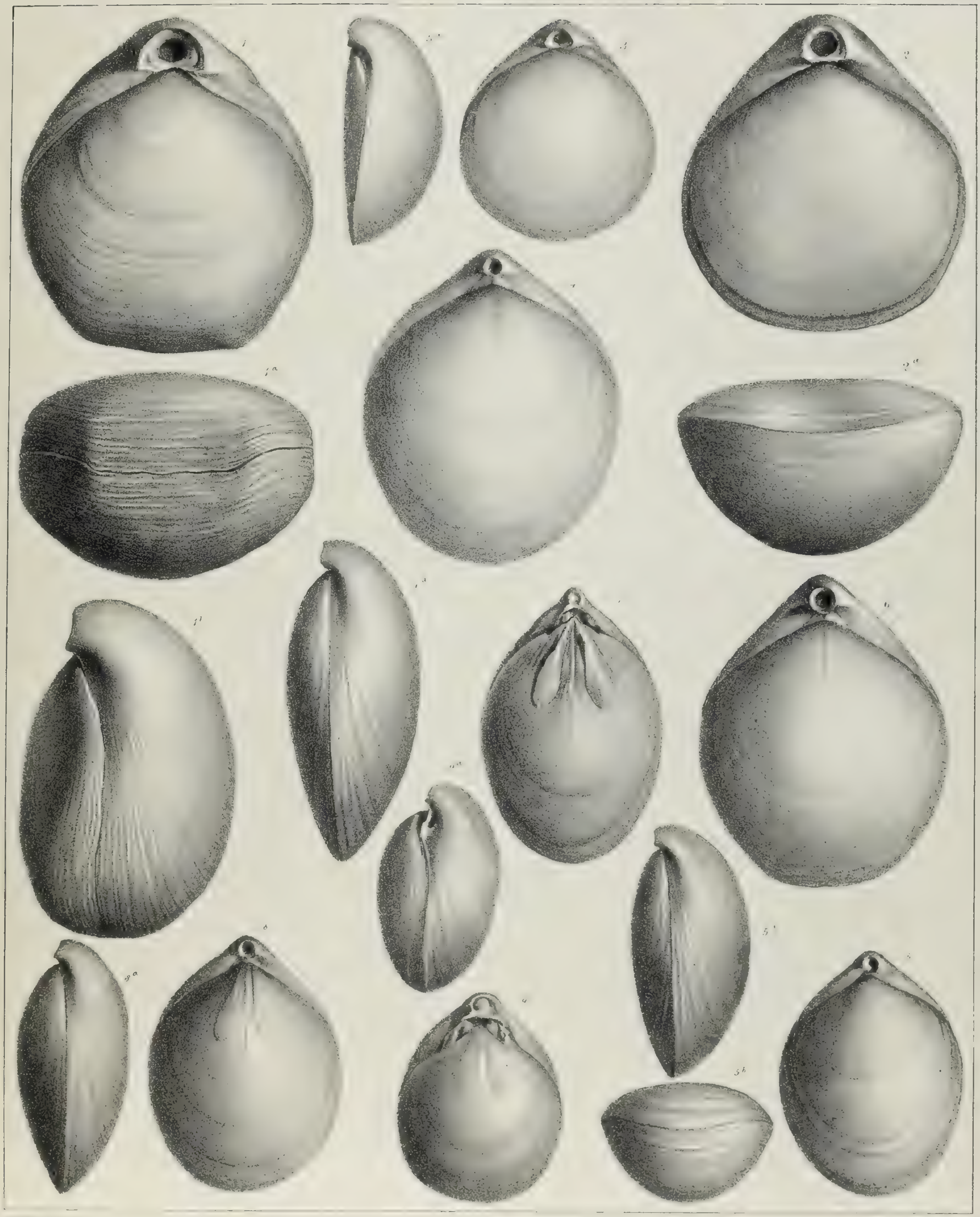
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PLATE IX.

Fig.		
1, 2.	Terebratula maxillata, *Sow.*	From the type of that author. Great Oolite, Bath.
3.	,, ,,	
4.	,, ,,	The largest specimen yet known; in the British Museum.
5.	,, ,,	Young specimen, without sinuations, from Wiltshire.
6, 7, 8.	,, ,,	Young, from Hampton Cliff.
9.	,, ,,	Interior.
10.	,, ,,	*var.* submaxillata, *Morris.* Inferior Oolite.
11.	,, ,,	
12.	,, ,,	

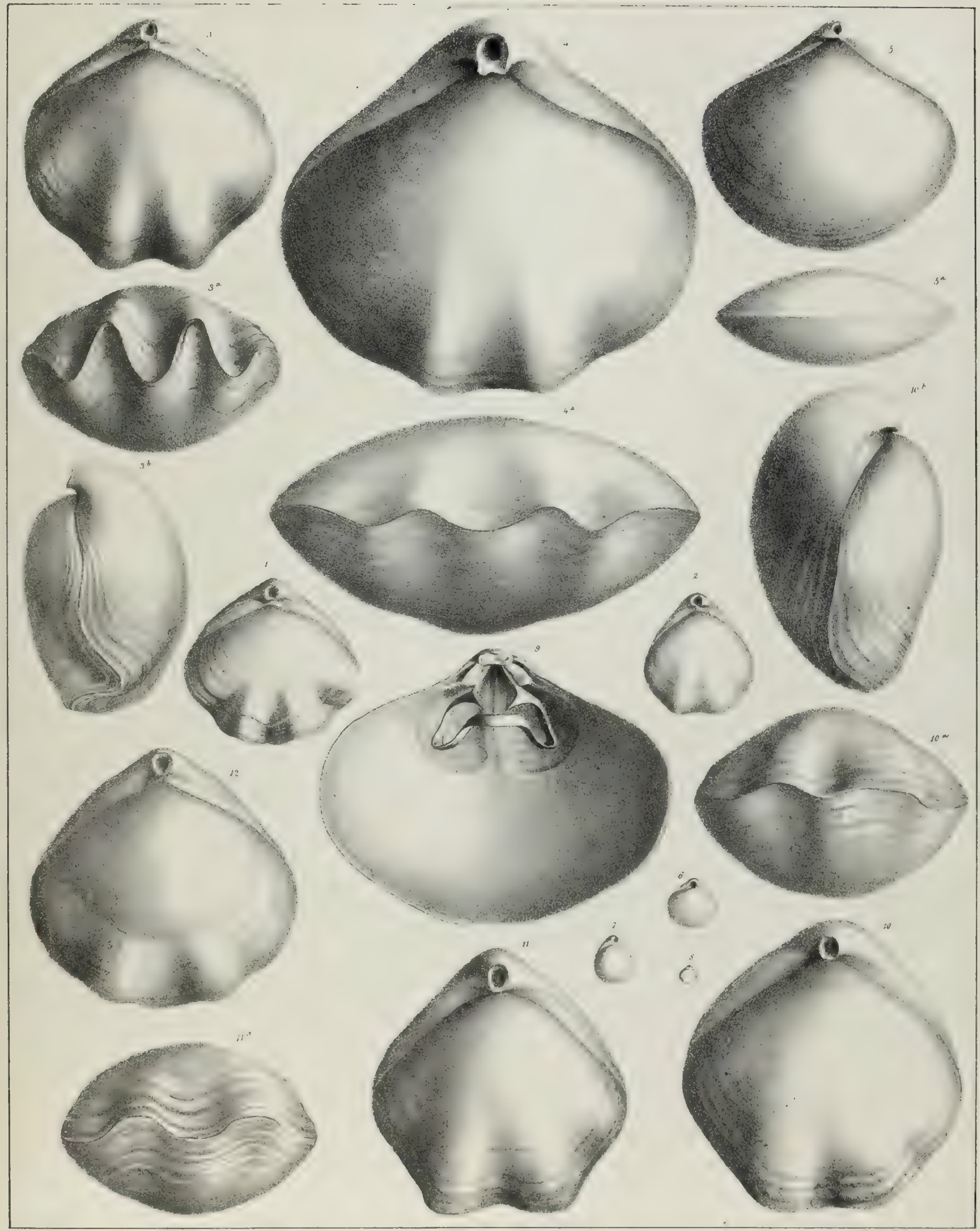

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PLATE X.

Fig.		
1, 2.	Terebratula perovalis, *Sow.*	The original specimens now in Mr. J. de C. Sowerby's collection.
3.	,, ,,	From the Inferior Oolite, Dundry.
4.	,, ,,	From the Inferior Oolite of Dunnington.
5.	,, ,,	The largest specimen, I believe, yet found in England.
6.	,, ,,	Interior.
7.	Terebratula impressa, *De Buch.* var.	From the Inferior Oolite; in the British Museum.
8.	Orbicula reflexa, *Sow.*	From the Lias; in the British Museum.

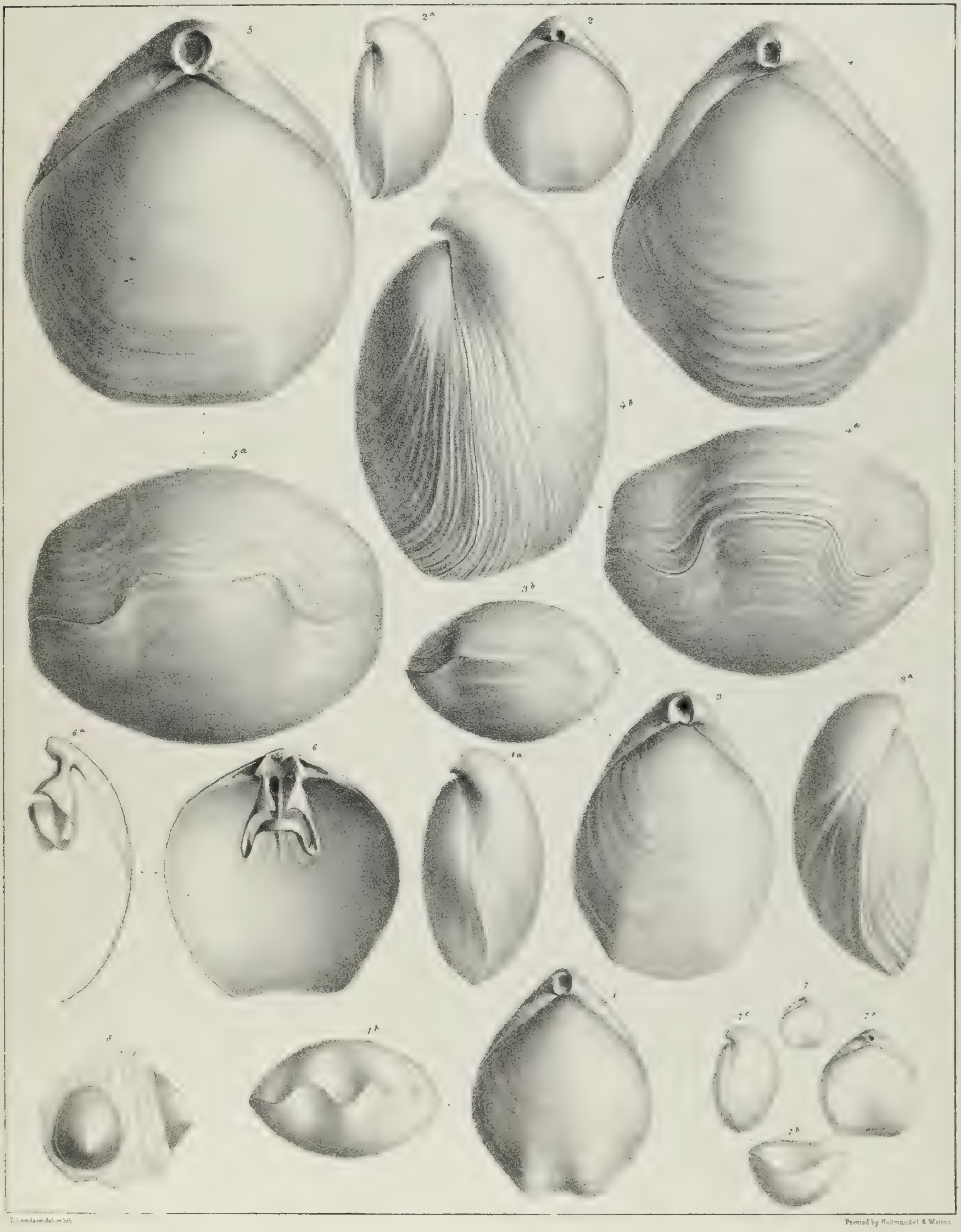

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PLATE XI.

Fig.			
1.	Terebratula intermedia, *Sow.*		Cornbrash.
2.	,,	,,	
3.	,,	,,	
4.	,,	,,	Young shell, without biplication.
5.	,,	,,	Interior, from specimens in the British Museum.
6.	Terebratula Phillipsii, *Morris.*		Inferior Oolite, Dinnington.
7.	,,	,,	From Burton.
8.	,,	,,	Young shell.
9.	Terebratula sphæroidalis, *Sow.*		The type specimens in the collection of Mr. J. de C. Sowerby, from the Inferior Oolite.
10.	,,	,,	From the Inferior Oolite of Sherburn.
11.	,,	,,	Interior.
12.	,,	,,	A specimen illustrating the sinuous frontal margin observable in some specimens.
13.	,,	,,	Another specimen.
14.	,,	,,	From the Inferior Oolite of Dundry.
15.	,,	,,	A specimen, showing a cessation and resumed growth visible in some specimens.
16.	,,	,,	From the Inferior Oolite of Dinnington.
17.	,,	,,	Inferior Oolite of Burton Radstock.
18.	,,	,,	From the Inferior Oolite of Dinnington.
19.	,,	,,	The original specimen of *Ter. bullata*, Sow., now in the collection of Mr. J. de C. Sowerby.
20.	Terebratula globulina, *Dav.*		Natural size, from the Lias of Ilminster.
21.	,,	,,	Magnified illustration.

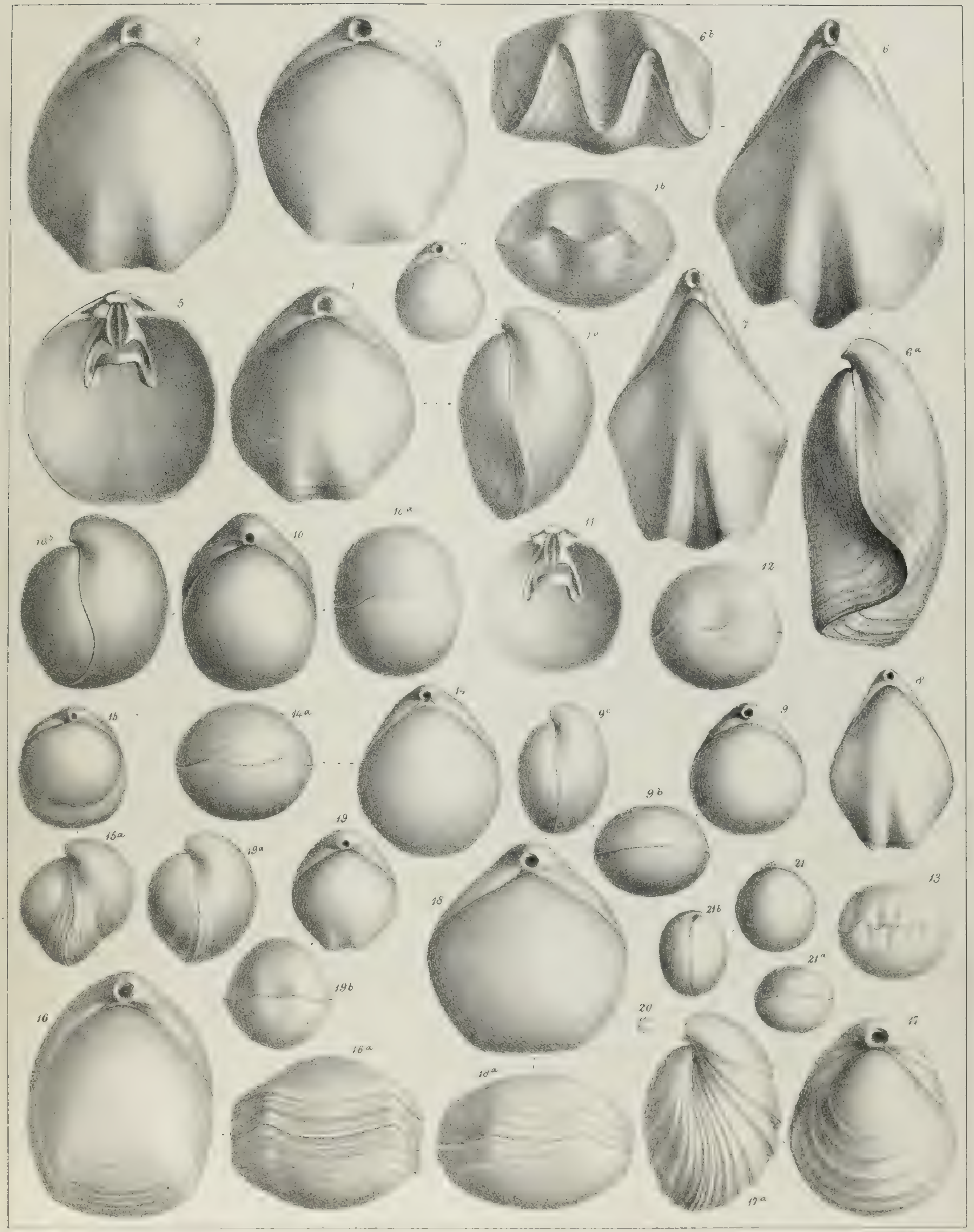
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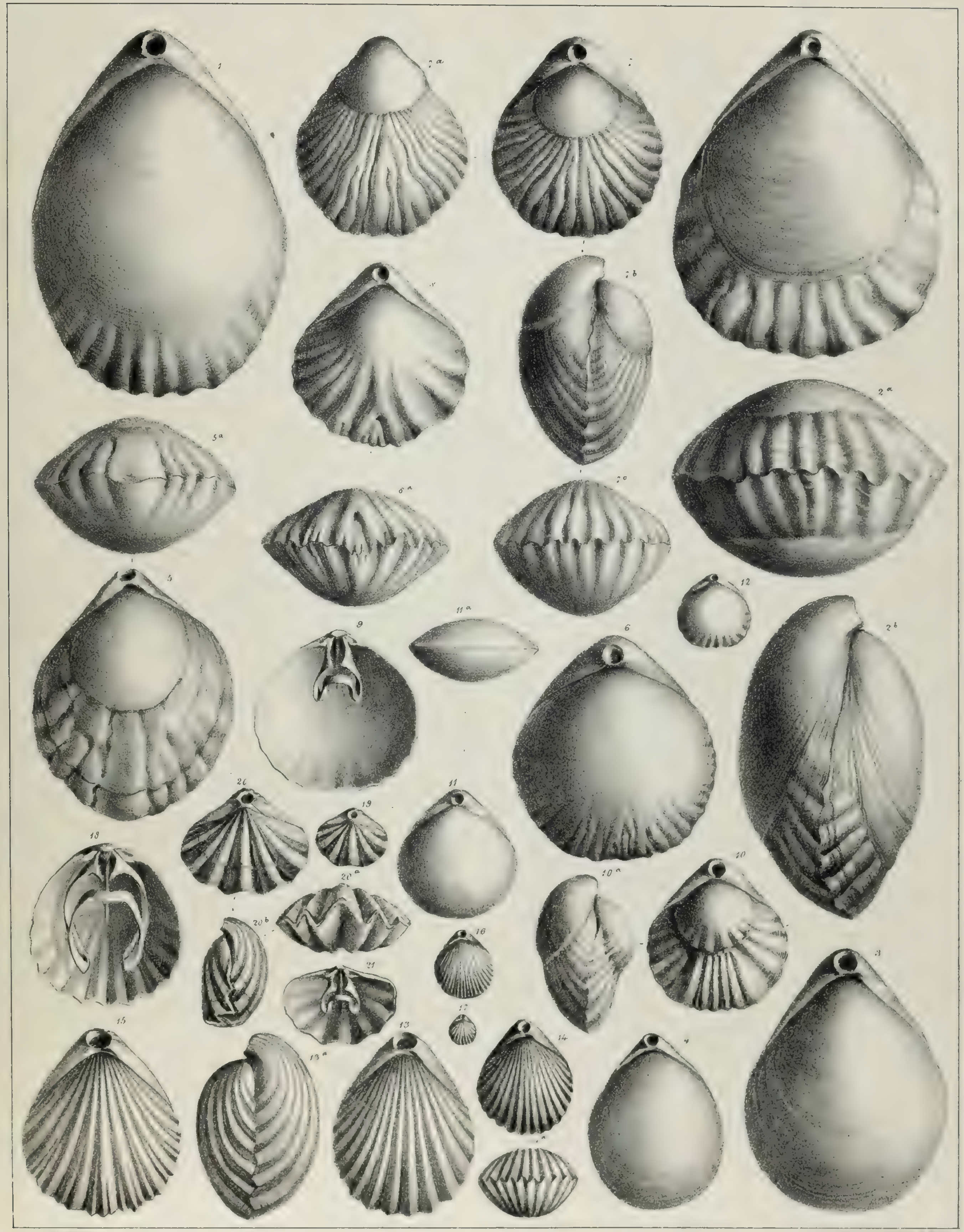
PLATE XII.

Fig.			
1.	Terebratula plicata,	*Buckman.*	From the Inferior Oolite, in the collection of the Geological Society, and in that of Mr. Morris. These are the two largest specimens of the species with which I am acquainted.
2.	,,	,,	
3, 4.	,,	,,	Smooth specimens; the frill or plication appears only at a more advanced age.
5.	,,	,,	
6.	Terebratula fimbria,	*Sow.*	From the Inferior Oolite. A very large specimen.
7.	,,	,,	
8.	,,	,,	
9.	,,	,,	Interior.
10.	,,	,,	
11.	,,	,,	Young specimen, quite smooth.
12.	,,	,,	A young shell.
13.	Terebratula cardium,	*Lamarck.*	From the Great Oolite, Bath.
14.	,,	,,	From the Great Oolite, Bath.
15.	,,	,,	A curious specimen, illustrating that, even sometimes at an advanced age, the plaits bifurcate.
16, 17.	,,	,,	Young shell, plaits bifurcating. *Ter. furcata,* Sow.
18.	,,	,,	Interior.
19.	Terebratula flabellum,	*Defrance.*	From the Bradford Clay, near Bradford.
20.	,,	,,	Enlarged illustrations.
21.	,,	,,	Interior.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20b
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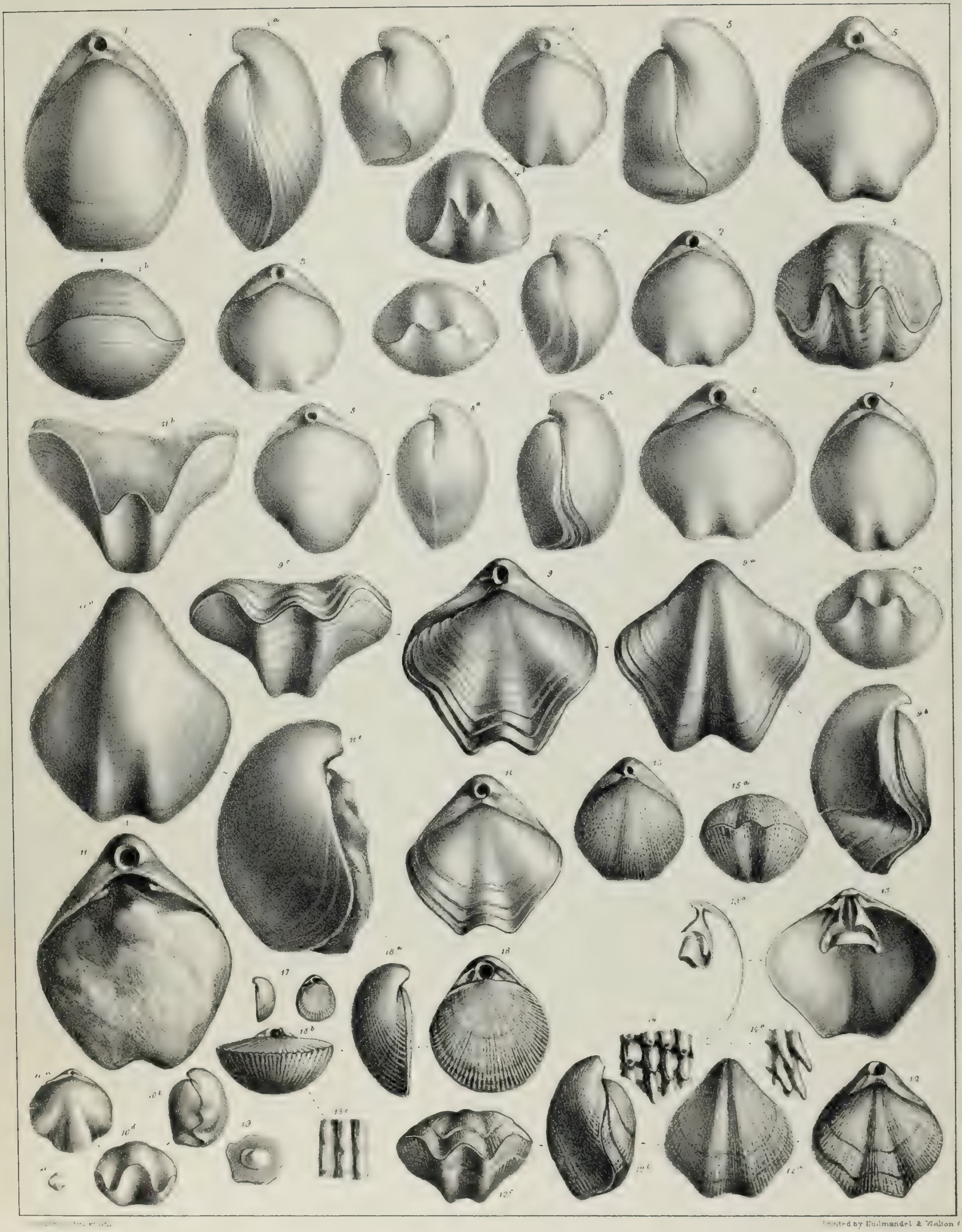
PLATE XIII.

Fig.	
1.	Terebratula insignis, *Schubler,* from the Coralline Oolite of Malton.
2, 3.	Terebratula globata, *Sow.,* from the original specimens now in the collection of Mr. J. de C. Sowerby: Inferior Oolite.
4.	,, ,, Dundry.
5.	,, ,, a curious variety from the Inferior Oolite of Cheltenham.
6, 7.	,, ,, from Cheltenham.
8.	Terebratula bucculenta, *Sow.* The original specimen now in the collection of Mr. J. de C. Sowerby — said to be from the Coralline Oolite of Malton.
9.	Terebratula Bentleyi, *Morris,* MS., from the Cornbrash of Wallaston, Northamptonshire.
10.	,, ,, ,, ,,
11.	Terebratula Bentleyi, var. Sub-Bentleyi, *Dav.,* from the Inferior Oolite of Minchinhampton.
12.	Terebratula coarctata, *Parkinson,* from the Great Oolite of Bath.
13.	,, ,, interior.
14.	,, ,, an enlarged fragment of the shell, showing the spinose surface.
15.	,, ,, an unusual variety.
16.	Terebratula pygmea, *Morris,* from the Lias of Ilminster.
16*a, b, c.*	,, ,, enlarged illustration.
17.	Terebratella hemisphærica, *Sow.,* natural size; Great Oolite, Hampton Cliff, Bath.
18.	,, ,, enlarged illustrations.
19.	Thecidea Dickensonii, *Moore,* MS., from the Inferior Oolite of Dinnington.



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